The Engineering and Mining Journal

VOL. LXXXII. NEW YORK, OCTOBER 6, 1906. NO. 14.

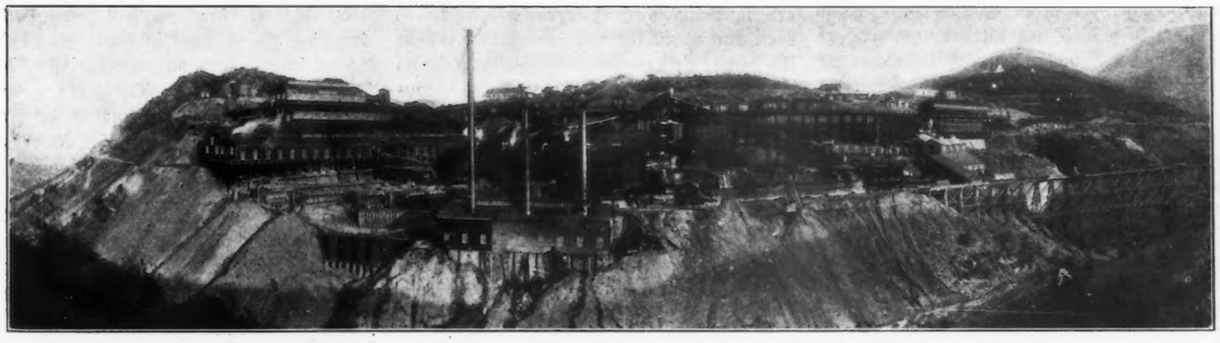
LA CANANEA MINING CAMP

The Mines, Mills and Smelter of the Greene Consolidated—Progress Toward More Economical Methods—A New System of Bedding the Furnace Charges—Introduction of the Caving System in the Mines—The Rapid Development of an Extraordinary Mining Camp

BY DWIGHT E. WOODBRIDGE*

La Cananea presents a wonderful contrast to its earlier appearance, and anyone who visited the camp in its beginning is more than ever impressed by what Colonel Greene and his colaborers have done in this unpromising desert. Where eight years ago were no persons other than a few warring prospectors, each too vindictively engaged in guarding his own prospect hole to look toward the development of the copper lodes that had brought him there; where the scattered *antigua* workings were long since abandoned; where a few Mexican peons were eking out the customary miserable existence of that region, is now a camp of 25,000 persons with all the necessities and most of the comforts of civilization. Instead of mere prospect holes there are many shafts, equipped modernly in every way; the one or two abandoned adobe smelters are replaced by one of the greatest works of its kind in existence; the frightened and poverty-stricken peons, afraid to own property other than the *serapes* and *sombreros* they carried about on their backs and covering their heads, are replaced by self-reliant men with money in the bank and an assurance for their future; and the camp is adding to the copper of the world at the rate of $10,000,000 per annum.

GENERAL VIEW OF CANANEA. MINE ON LEFT AND POWER PLANT AND MILL ON RIGHT.



GENERAL VIEW OF CONCENTRATOR.

In the development of the mines of the Cananea Consolidated Copper Company, whose stock is owned by the Greene Company, there have always been unusual and serious obstacles. The future has always presented so alluring a prospect as to cause a desire on the part of the management to push ahead faster then conditions warranted. In the past this beguiling invitation was frequently accepted, much to the confusion of subsequent operations. It has been no small task to connect the workings and mills by wagon roads and railways, but the sides of the mountains above Ronquillo and Chivatera, and on to Puertocitos, are now lined by an elaborate and necessary system of surface ways. The narrow-gage railway runs for 12 miles up the cañons, and so magnificent are the views to be obtained from it, so delicate its bridges, so elaborate its engineering, that it can be called the "scenic line of the southwest." The corresponding wagon roads cover a distance of more than 15 miles. Underground the company has one main transportation tunnel 6000 ft. long, through which it draws its ores in cars of 10 tons capacity and in trains of 12 carloads each by electric traction. It has also more than 35 miles of under-

* Mining engineer, Duluth, Minn.

ground workings, main and subordinate. Subsidiary to its mine operations this company has all necessary undertakings, including stores, factories, foundries, sawmills, and other industrial enterprises that must be carried on in a district remote from a base of supplies. The underground workings have been piped throughout and springs distant in the desert have been drawn upon for a constant supply of pure water, for mines and the town. The mines themselves supply a portion of the water required for concentration, but the greater part is brought from Ojo de Agua, and as these springs are nine miles off and at a much lower elevation, the greatest care is exercised that the process of concentration shall consume as little new water as possible.

The orebodies are replacements in porphyry, except Elisa, which is a vein in limestone. The region is similar geologically to that of southern Arizona, and all the evidences of complete vulcanism there present are manifest here also. Copper-bearing solutions have penetrated from main faults and their subordinate fissures for hundreds of feet and have so converted the porphyry into lean silicious ore that the company has vast deposits of low-grade concentrating ore carrying from 1 to 4 per cent. copper. At present the major production comes from the Oversight properties and the Massey orebody, the latter a deposit that at the time of my last previous visit to Cananea, two years ago, had just been cut as a stringer of ore in barren workings. Along the course of the great fault and fissures extending on the zone of mineralization on this company's property there are eight mines, of which not all are operated at this time. Some are under development for future production; others, such as Cobre Grande, are not of a grade desirable at present. The average copper in these ores, as now mined, is from 3.8 to 4 per cent., though if there should be a decline in the market price for the metal it might be possible to raise materially the grade of the ore mined. The future of the company lies, not so much, however, in the richer ores, as in the vast deposits of lean concentrating silicious ores, carrying chalcocitic enrichment in innumerable small seams and stringers throughout the porphyry and varying in grade from a percentage too low to permit mining to high-grade glance. Some parts of the mine carry considerable native copper. Ores of the Oversight zone are inclined to be rather talcose, supplying material sliming badly, and it is in these zones that the greater part of today's mine operations are undertaken. In a number of the mines, especially Oversight, the main transportation tunnel opens a great tract of mineral bearing ground, and mining can be conducted here for many years at minimum costs.

A novel and interesting application of the conveying belt system is being installed at the furnaces of the Cananea Copper Company and should be in use shortly. As is well known to engineers this works has always been hampered by the lack of an adequate storage between the mines and smelter, making it impossible to prepare suitable smelting mixtures in advance of the reducing operation itself, or even to secure accurate samples and analyses beforehand. The great advantage of the mixture plan was demonstrated years ago by the lead smelters, and has recently been recognized and adopted by some of the more progressive copper-smelting works, as, for instance, by the Copper Queen, at Douglas, Arizona, and it has been Mr. Dwight's effort to put this works in line with the best modern practice. Many projects for providing the Cananea works with this necessity were considered. That prepared by the Robins Conveying Belt Company, of New York, using the system designed by its engineer, Edwin H. Messiter, was deemed best suited to topography and general conditions at Cananea, and was adopted. The plant has been under construction for some time and is now nearly completed.

This part of the works consists essentially of two systems of rubber belt conveyors and trippers. One system takes the ore from the hopper bottom bins into which it is received from the railway dump cars, passes it through the sampling mill, where the coarser lumps are crushed and an accurate automatic sample is taken, and then stacks the crushed and sampled ore on long ore-beds. These latter are of triangular cross-section and are built up by a tripper which moves back and forth on an overhead belt over the center line of each ore pile, and, in its shuttle-like passage back and forth, drops ore always on the crest of the pile. It thus disposes the successive additions of ore in concentric layers and gives a uniform composition for all cross sections, from one end of the pile to the other. There are three of such stacking conveyors, each for a pile of 8000 tons, thus giving a total bedding capacity for 24,000 tons.

The second system of belts is for conveying the smelting mixture from the reclaiming machine, as it attacks the pile, to the feeding devices at the blast furnaces. A trench passes along on one side of each ore pile, in which runs a conveyor belt. The reclaiming machine is a great girder-like car spanning ore floor and trench, and, as it moves longitudinally toward the ore pile to be reclaimed, cuts a slice clear across the bottom of the pile by means of a scraper conveyor, and delivers the material in a continuous stream into a hopper which feeds the belt conveyor in the trench. A rake-like tickler keeps the end face of the pile sloping toward the machine, so as to present a thin edge for the plow-blades of the scraper conveyor, and also prevents undercutting and caving. The carriage is actuated by electric motors, and speed of cutting and advance can be readily regulated by the operator, who is guided by signals automatically set at the semaphore bin near the furnaces. This latter is a bin placed between two of the belts in the series leading to the furneces. It is supported on springs which allow a few inches of vertical movement, depending on the weight of ore contained in the bin. Settlement of the springs throws a semaphore signal arm up or down for the information of the operator of the reclaiming machine at the ore piles. When the demands of the furnace conveyors are depleting the supply of ore in this bin the springs raise it up, and the operator knows he must speed up his machine; and *vice versa*.

There are two classes of blast furnaces at the Cananea plant. The old style furnaces of the Mitchell hot-blast type can be fed only from one side and mechanical feeding is practically out of the question. These are being replaced gradually by furnaces of modern design, so placed as to be accessible from both sides, and they will be fed mechanically. One such new furnace is already in place, arranged for hand feeding, but in connection with the new conveyor system it will be equipped with a mechanical feeding device. This will consist of a long narrow box on each side, of a size to hold a furnace charge. It can be set in a vertical position to be filled from the conveyor belt, and then swung down to a horizontal position opposite each furnace door, whence the charges are dropped into the furnace. The old style furnaces will be served by dropping the charges in front of the feed doors from overhead measuring boxes filled by the conveyor. These charges will then be fed into the furnaces by hand, but this hand feeding will be done away with as the furnaces are made over to the new type.

It will be seen that the whole feeding system is based on using measured, and not weighed, charges. But as the measuring boxes can be checked against the known weight of the ore beds, it is expected to keep well within allowable limits. At present no weighing of charges is permitted, on account of the lack of room on the charge floor, and the rough measurement by barrows is depended on, this being checked at the close of each month by totals of railroad track-scale weights.

The crushing and sampling mill which precedes the ore beds contains Gates breakers for handling the coarse, revolving screens for removing the fines to be smelted in reverberatories, and automatic samplers of the rotating barrel type which take out a sample of one per cent. in two successive cuts of 10 per cent. each. This sample of one per cent. is worked down to final pulp for assay by standard methods.

The whole sampling and bedding plant

is of very substantial construction. It is designed to provide many possible variations to meet changing conditions, and promises to make some direct economies in labor besides other indirect economies even more important than the former, in improved metallurgical work, higher speed, and greater regularity of operations. During the entire management of the Cananea property by Arthur S. Dwight he worked toward this end, and now his arduous, untiring and exceedingly well planned labors will show the culmination of results for which he has been steadily striving, and which have excited the interest and elicited the admiration of engineers who have followed them. Mr. Dwight's work was hampered by various local conditions far more seriously than can be appreciated from a distance, and the Cananea works, as they will soon be completed, will stand as a monument to his high ability.

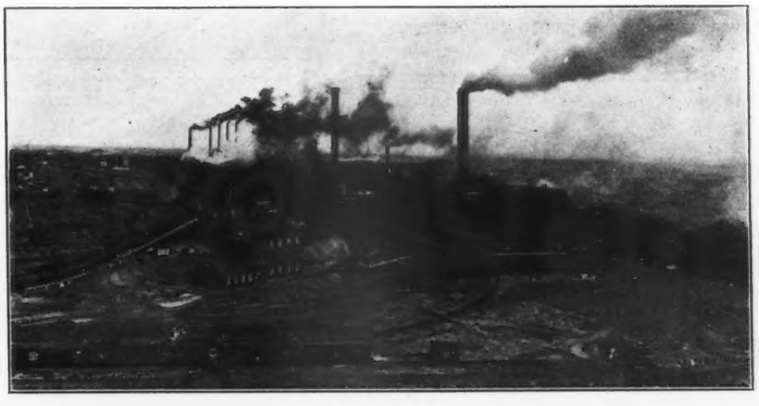
VANNER ROOM, CANANEA CONCENTRATOR.

The capacity of the receiving, sampling and bedding machinery is such as to permit the handling, in 10 hours, of the entire day's receipts of smelting material. Reclaiming and feeding machinery will, to be sure, operate continously during the 24 hours, keeping pace with the furnaces. Each of the three ore floors has a capacity, when full, for 8000 tons; assuming one of the beds as made, one half made and one half used, there would be a working capacity of 16,000 tons, or eight to 10 days' storage of smelting mixture ahead of the furnaces, which should be ample to overcome all ordinary irregularities in the mining and transportation departments, any of which can now interfere seriously with the operations of the smelting works.

In the illustration, which covers the bedding system from the receipt of ore to the furnace charge, the first of the three beds is shown supplying the furnaces, the second in process of formation, and the third is in reserve.

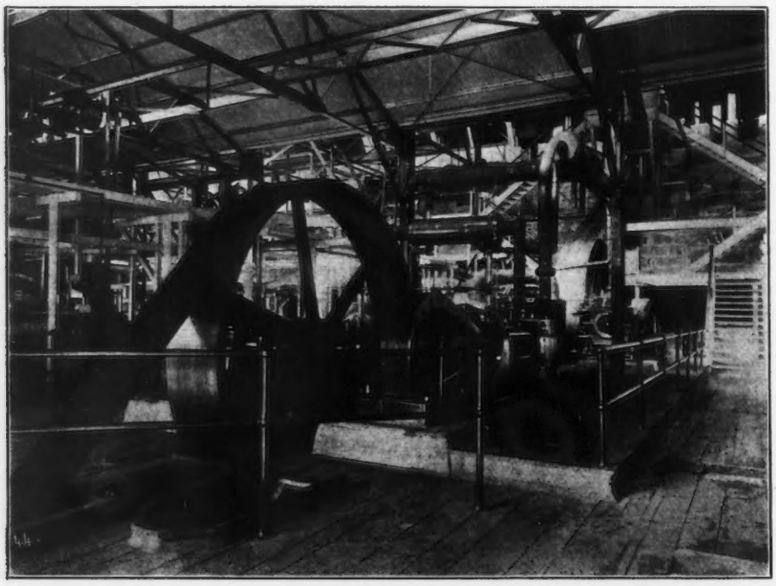
The average monthly production of the works of the Cananea Consolidated Company is in the neighborhood of 5,500,000 lb. of copper. This is gradually being increased as concentration capacity is enlarged and other betterments are brought into line. There are now eight blast furnaces, varying in size. The Mitchell hot-blast furnaces have been considerably modified from the original type. Capacity will be increased in the near future by a battery of four McDougall roasting furnaces, 6-shelf, 50-ton, 18-ft. diameter, and a new large reverberatory, which is in commission. This is 100x19 ft., and is very heavily built. At the outer end of the furnace three 300-h.p. Stirling boilers have been set, and it is expected that two of them can be continuously operated by the waste heat of combustion. Indeed, if it were not for the saving of heat by this installation the use of reverberatories would be impossible at Cananea, on account of the high cost of fuel. This reverberatory is handling all the flue dust, thus relieving the blast furnaces of excessive fines. The blast furnaces will be gradually replaced by new stacks of a uniform size, 56x180 in., set in line for automatic feed from the charging belts, and in these the ordinary water-jacket cold-blast type will supersede the Mitchell furnaces, which, however, have never been run hot blast. It has been found possible during the last year or two to reduce materially the amount of barren flux introduced into the furnaces, and the concentrates fed in now run about 9.5 per cent. copper, 22.8 silica and alumina, 28.5 iron, 31.8 sulphur, and a small amount of silver. Raw ores running above 5 per cent. are smelted directly. The company treats some custom ores, and ships some of its concentrates to Globe and Clifton, where they are of value for their sulphur, and to El Paso. The great bulk of ores smelted is concentrates, and the proportion of this class of charge work must increase.

Concentration at Cananea is done in two large and modern mills, the second of which has been in operation only about a year. With the exception of alumina in these ores concentration is a comparatively simple matter; the tailings loss is about 1.25 per cent. Concentration is done as coarse as possible, on account of the tendency of the ore to slimes, and material for the smelter is first taken off at double one-compartment jigs which receive, through trommels, material graded to ⅝ and ⅜ in. Material to be recrushed passes through rolls and 3-16 in. trommels, and then to jigs, where another product for the concentration bins is taken off. Another set of jigs is introduced before recrushing, and material is passed over sand jigs before it goes to Bryan rolls for another breaking. From the rolls it passes through spitzkasten and then through hydraulic classifiers to Wilfley tables. What is not passed to the concentrating bins at this point goes to pulp thickeners and Frue vanners.



VIEW OF SMELTER.

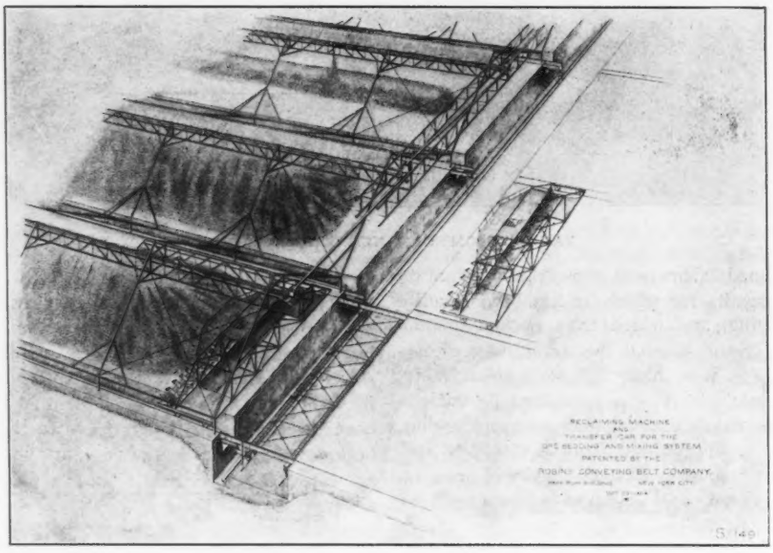
The two concentrators are now treating about 2400 tons a day, and No. 2 mill is being enlarged by the addition of tables and vanners. It is the intention of the management that more and more of the



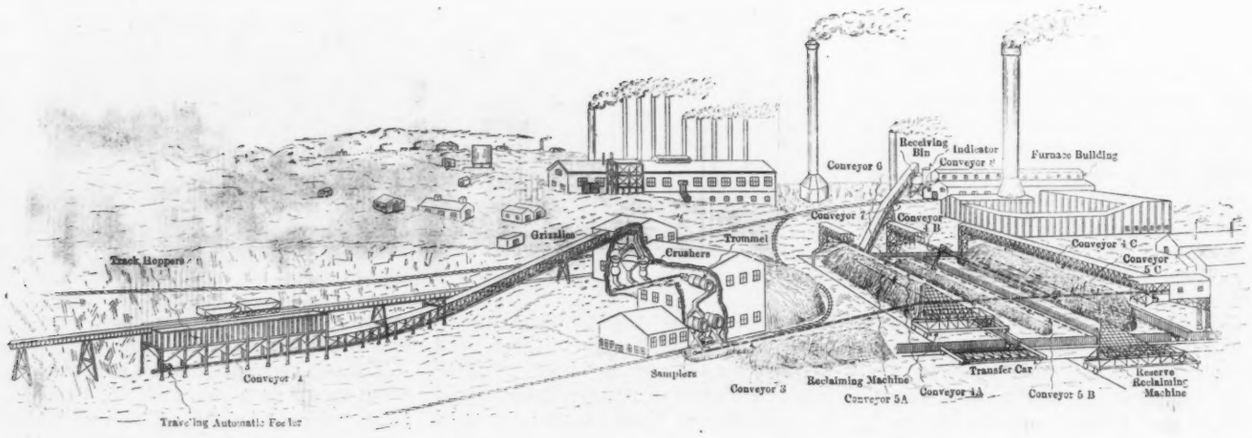
INTERIOR OF POWER HOUSE.

mine's product shall be put through the concentrators before it is smelted, and a considerable further addition to mill capacity is likely to be made.

For some time previous to his resignation Mr. Dwight, the general manager, and J. H. Kirk, manager of the mining department, had been considering the propriety of changing mine methods from the well known square set to the caving system; and last fall Messrs. Dwight and Kirk visited the Lake Superior iron-ore regions, inspecting carefully the Vermilion and Mesabi ranges. They saw mines where 800 ft. thickness of jasper capping was being successfully caved, and which were making a product of about 5.5 tons per day per man. They also saw, on the Mesabi range, mines whose conditions were quite similar to their own, where the daily product, from caving, was up to seven and eight tons per day per man and where the consumption of timber was but a small fraction of what was required by the square-set system in their own mines, where the ground is comparatively heavy. They determined to introduce caving at the earliest opportunity, and since then the Cananea orebodies have been operated with this in view. Already the new system is in operation in parts of the mine, and the change is being effected with no difficulty and with the active interest and co-operation of the miners, who were soon led to see the improvement in conditions that would result therefrom. The change has been brought about by means of first cutting the ore down in thin slices, gradually building up a gob of interlaced boards, etc. After a few slices have been taken out and the gob has become sufficiently solid it will be a simple matter to begin caving in moderately high stopes. It is not planned to take out very high sets, perhaps not to exceed 10 ft., and it is believed that there need be no difficulty in keeping the top of the successive slices perfectly free from dirt. Already the surface of the mountain over the Massey ore deposit is showing caves as the result

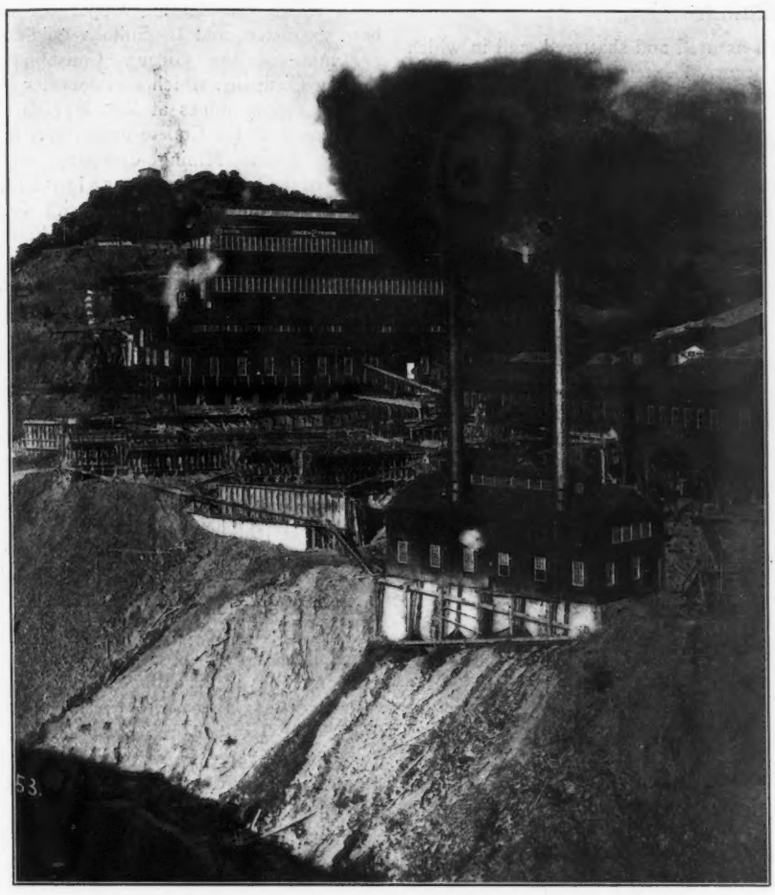


RECLAIMING APPARATUS.



ORE BEDDING AND MIXING MACHINERY.

of drawing down the superincumbent earth and rock. Cananea has been securing a product of about 3000 tons per day with 2500 miners employed, and it is quite certain that after the new system has been adopted throughout the mine this number will be more than necessary to maintain the same product. Costs have already been affected very favorably, but full benefit is not yet reached. It will be great.



FRONT VIEW OF CONCENTRATOR.

The number of men employed in mines and reduction works of this company is very large, about 5500 being on the payroll regularly, though there are between 8000 and 9000 names enrolled as employees. In this fact is seen one of the difficulties of employment on the Mexican side of the line, where labor has not the ambition for, nor incentive to, steady work; and two or three men are required on the rolls for every day's work. Cananea's monthly outturn of copper is about 5,500,000 lb.

The number of men, even that portion steadily working and drawing pay, is far above that at the neighboring mines of Bisbee per pound of product, but there is no concentration at Bisbee, and the copper tenor of the ore is such that three tons must be mined at Cananea to produce the same amount of blister copper as comes from one ton of Bisbee ore. The Copper Queen, employing 4000 men, makes 8,500,00 lb. per month, but when the divergence in tenor of the ores is taken into the calculation, the difference in favor of Bisbee is not so great as might appear at first thought. Cananea does not greatly advantage by reason of its employment of Mexican labor. Its Chinese workmen, on surface, receive low pay, but the Mexicans get from 3 to 3.5 *pesos*, for what costs $1.50 to $2, gold, at Douglas and Bisbee, while the miners draw wages equivalent to that paid their white brethren on the other side the line. Highly skilled white labor and professional men receive, of course, pay fully as high as, if not more than, that on the American side the line.

The average metal saving in concentration at Cananea is 73 to 80 per cent. of copper, depending on the grade of ore treated and the amount of aluminous material. The average metal saving in the smelter is 90 to 93 per cent. of the copper, based on the best samples obtainable with present facilities.

SIDE VIEW OF CONCENTRATOR.

Increased Cost of Labor and Material.

The increase in the cost of the principal building materials, other than iron and steel, and the wages for labor was expressed in the following table in *Engineering-Contracting* of Aug. 6, the figures being for the vicinity of New York:

MATERIALS.

	1896.	1906.
Whitewood (No. 1) per M. ft	$30.00	$48.00
Yellow pine flooring, per M. ft	17.00	30.00
Plain oak, per M. ft	35.00	53.00
White pine dressing, per M. ft	23.00	48.50
Spruce, per M. ft	13.00	26.00
Hemlock, per M. ft	11.00	22.00
Laths, per M. ft	2.00	5.50
Common hard brick, per M	5.50	11.00
Glass (window) per box	1.55	1.72
Lime, east common, per bbl	.70	.92
Rosendale cement, per bbl	.80	.60
Atlas Portland, per bbl	2.50	1.45
Nails, wire, per keg	2.80	2.15

WAGES.

	1896.	1906.
Bricklayers, per day	$4.00	$5.60
Stonesetters	....	5.00
Plasterers	4.00	5.50
Carpenters	3.50	4.50
Plumbers	3.50	4.50
Painters	2.50	4.25

Increased wages are general throughout the United States and the demand for labor in all sections is unusually heavy. The high cost of lumber is indicative of the reckless manner in which forest resources have been dissipated; it will advance the use of steel and cement.

THE COPETE DISTRICT, CENTRAL SONORA

The Complex Geology—Some Large Bodies of Copper Ore—Transportation

BY F. J. H. MERRILL*

This area, in which is La Sultana gold mine, of the Giroux Consolidated Mining Company, is in the Ures district, about 52 miles east of Carbo station, on the Sonora railway, 124 miles south of the international boundary at Nogales, and 12 miles north of the village of San Miguel, now known as Horcasitas.

GOSSAN OUTCROP OF SULTANA VEIN.

It lies in an area of low mountains, about five miles east of the great plain, traversed by the railway, and about four miles west of the San Miguel river. This mountainous tract is much broken, and has been cut by erosion into numerous ridges and peaks, the highest of which, called "El Picacho de Rayon" or "de Copete," is a well known landmark, two miles north of the locality under consideration.

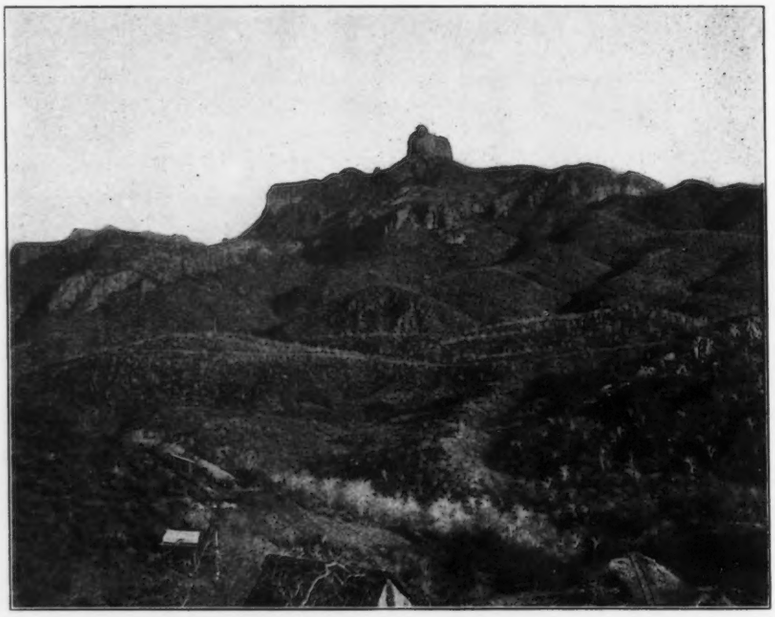
The geology of the region is complex. The hills consist in part of rhyolite, capped with volcanic tuff and conglomerate, portions of a great sheet which once covered the whole district, and now forms the summits of the highest peaks, such as the Picacho de Rayon, above mentioned Beneath these volcanic beds is a great formation of folded and metamorphosed sediments, consisting of limestone, shale and quartzite, exposed in some of the deeper ravines. The limestones are clearly of Cretaceous age. Cutting the country with a northwest trend, is a broad zone of faulting, in which the rocks have been much fissured and shattered, and in which has occurred extensive mineralization with the formation of important veins of gold and copper ore. Some of these are marked at the surface by great outcrops of gossan, consisting of cellular quartz and limonite, forming conspicuous hillocks. The gossan has resulted from the oxidation of large bodies of iron and copper pyrites, probably mingled with some galena, which, by decomposition and oxidation, have passed through various changes from the sulphides to oxides and carbonates.

The principal mines in this area are those of the Copete Mining Company, from which considerable copper ore has been extracted, and La Sultana gold-copper mine of the Giroux Consolidated Mining Company, which also operates important copper mines at Ely, Nevada.

Adjacent to the Copete property is that of the Belene Mining Company, while south of the Sultana, and over a low divide, is a group of prospect holes with some development, on the gold property known as Cerro de Oro. There are also, in the neighborhood, a number of free-milling quartz veins of moderate width carrying good values in gold.

The larger veins are all rich in copper and are oxidized to a great depth. Development work on the Sultana property is said to be down about 1100 ft., on the dip of the vein which is about 60 deg., and an orebody nearly 30 ft. in thickness is said to be opened up for a considerable distance on the bottom level. The vein is partly in limestone and partly in rhyolite and the large orebody may be in a zone of secondary enrichment. Pending the erection of a smelter at Carbo, which is now in progress by the Giroux company, the ore is shipped to El Paso and according to smelter returns runs from $50 to $350 per ton in gold. Ore less than $50 in value is not shipped to El Paso, but is held in reserve for private smelting.

In the San José vein of the Giroux company, nearly parallel to the Sultana, only copper has, thus far, been found and in the Copete vein but little gold occurs.



PICACHO DE COPETE FROM LA SULTANA.

At the time of my visit, I was not afforded an opportunity to examine the

*Mining geologist, 225 West End avenue, New York City.

underground workings of these mines, but the surface indications suggest very strongly that there has been very intense mineralization at this point and it seems probable that other orebodies as rich as that of the Sultana may be found here. With the completion of the Giroux smelter, increased activity may be expected in the management of the Sultana property.

In the great gossan outcrop of the Sultana vein are several *antigua* openings, showing that the early Spanish miners found something there to attract them. These openings are now used as dwellings by the miners.

The Copete company has a 200-ton Mitchell smelter erected near the mine and has established a pumping plant which supplies both the Copete and the Giroux companies with water from the San Miguel river, about four miles distant.

Transportation from the railroad across the plain is not difficult, as the grades are gentle. In the mountain district the road is jointly maintained by the Giroux and Copete companies, the latter having built at large expense, over the last two miles where the grades are steepest, a wagon road which is kept in very good order.

Although this is only one of the many richly mineralized areas in Sonora, there are comparatively few where the orebodies are so wide or so extensive both in length and depth. There is every reason to expect it to become one of the leading camps of northern Mexico.

Nickel Deposits of North Carolina.

In a paper on the nickel deposits of Webster, N. C., published in the *Journal* of the Canadian Mining Institute, Volume IX, Dr. Alfred E. Barlow comes to the conclusion that the deposits are of such origin that they will be found comparatively shallow, varying from almost nothing up to 30 ft., or in some places to even 50 ft., depending entirely upon the depth to which the decomposition has proceeded. It is not possible to ship or otherwise utilize the whole of the material exposed by the trenches, but it is certain that the expense of considerable dead work can be borne in order to secure comparatively rich ore, although in so doing a large amount of material will have to be rejected. However, in the present state of the nickel market, with the large supplies of ores which are assured by the deposits of Sudbury, Ontario, and New Caledonia, it is unlikely that the deposits of North Carolina will receive more than passing attention.

The nickel and cobalt resources of North Carolina have received a considerable amount of investigation. In 1905 the United States Chrome and Nickel Company was organized to work certain of them, but decided, after some development, to abandon them.

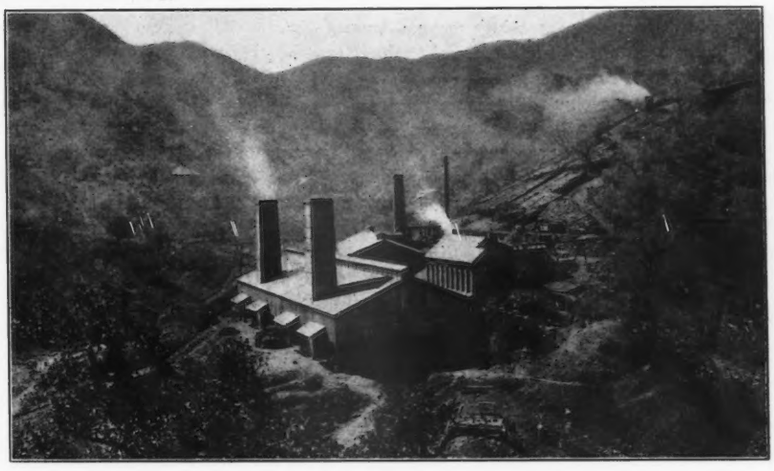
THE SAHUARIPA DISTRICT, SONORA, MEXICO

Promising Gold and Copper Mines—Prospects of Improved Transportation—Present Mining Conditions

BY C. NELSON NELSON

The Sahuaripa district lies in the middle western part of Sonora, bounded on the east by the State of Chihuahua, on the south and southwest by the district of Ures, on the west and north by the district of Moctezuma. At present the district is remote from a railroad, being 160 miles from Temosichic in Chihuahua, and about the same from Nacozari, Sonora. There are practically no maps of this section of the State that are at all reliable; the Greene Gold and Silver Company has compiled one of the best in connection with its prospecting concession, the "Greene Zone." The district is reached by mule trails, either from Nacozari, by way of Moctezuma, or from Temosichic on the east, have made the district more accessible and prospecting and development are being carried on more and more vigorously.

The climate and topography of the Sahuaripa district have the same characteristics as the *cordillera* region elsewhere in Mexico. In the eastern part of the district the ranges are about 9000 ft. in elevation, while Sahuaripa itself is only about 1200 ft. above sea level. In most places water power is easily available for about six months in the year, and large fall is readily obtained. During May and June the streams are very low, and during the rainy season carry so much mud that some sort of impounding reservoir system would be necessary to develop a reliable power.



CIENEGUITA COPPER COMPANY'S SMELTER.

Temosichic in Chihuahua, due west through the villages of Tosanichi and Tutuachi.

The Sahuaripa district is perhaps best known by the Mulatos mine, which has been producing for a number of years. there are several *antiguas* in the district, among which are the Ostimuri, Bayoraca, Teopari and the well known "lost mine," of Taiopa. The recent development has been done only in the last 10 years, as first the Apache wars, and more recently the Yaqui troubles have kept prospectors out of this part of the State. The eastern part of the district was once one of Geronimo's headquarters, and the native towns have hardly yet recovered from his raids. The developments at Nacozari, and the wagon road to Moctezuma on the west, and the Chihuahua al Pacifico Railroad to

The geology varies so greatly in all parts of the district that it is hard to generalize. The district may be said to consist chiefly of numerous igneous flows, widely varying in composition. Igneous conglomerates and breccias are common, and isolated beds of limestone are occasionally met with. Faulting is common, though mining development has not been carried on far enough to warrant much description. Dikes exist in great numbers. The ores are pyrite and arsenopyrite (carrying silver in tetrahedrite), lead-silver and a few free-milling gold ores. Rumors of placers are numerous, but none, so far, seem to have justified more than occasional working by natives. *Petanque,* or "gray copper ore" (tetrahedrite) is the sort for which the Mexican prospector is constantly on the lookout. The whole district may be be said to be

*Mining engineer, La Calera, district of Sahuaripa, Sonora, Mexico.

extensively mineralized, though whether any very large orebodies exist is still to be proved.

The great drawback to development is, of course, the difficulty of transportation. There are rumors of railroad extensions which will tap the district, such as a line south from Terrazas in Chihuahua, and an extension of the railroad from Miñaca, Chihuahua, to the westward; also the extension from the road from Nacozari down to Moctezuma and perhaps farther south. A line is being built to La Bufa which will make mule transport shorter. The Yaqui disturbance has done much to hinder railroad development in the southwestern part of the State, and no one company seems strong enough to build its own line to existing railroads. The concession of the government to the Greene Gold and Silver Company has done much to open up the country. Already a wagon road is built from Temosichic to Concheno in Chihuahua, and there is talk of one to Mulatos. Undoubtedly the Greene company will soon have good transportation to its largest mines, and the smaller companies will build branches to reach their own properties.

Mule transportation is growing more and more expensive. For ordinary freight a year ago $13.50 a *carga* of 300 lb. was the charge from Temosichic to the eastern part of the district; this has gone up to $20@22, while for machinery and other special freight, contracts are made at considerably higher prices. The shortest time for this trip is from two to three weeks, while if the rivers are at all high the time may run up to over a month. Delays of forwarding agents have caused some freight to be delivered six months and even one year after purchase in Chihuahua. Of course all machinery, etc., has to be in sections of 300 lb. or less, though some water-jackets of 450 lb. have been brought in. Sections of 100 to 150 lb. are the simplest to freight, as the load can be properly balanced. On groceries and mediumly heavy goods the freightage thus comes to about 15c. per kg. Often on large orders the freight is over one-half of the original cost of the goods.

Traveling is done chiefly on mule back; horses do not stand the trip as well. The cost of a single trip of three Americans and their baggage from San Tomas to La Calera (160 miles) was as follows: Three saddle mules and four pack mules with two *mozos*, $150 per trip of 6½ days, including the return of the animals; grub box, $60—a total of $210. *Mozos* are paid $2 per day, with food; mules $1 per day, including the time for return trip. The grub box must be well filled, as nothing but tortillas and cheese can be bought on the trip. Corn for the animals can generally be procured on the road.

The mail service is naturally very poor. Sixteen days is the best time on record for communication with eastern United States.

The Mulatos mine is the best known in the district. It has been worked as a high-grade gold deposit for many years, first by the Mexicans, and later by American and English companies. Small veins of free gold were followed by tortuous drifts and the gold recovered by amalgamation. Very pretty specimens of free gold are found, and the *gambucinos*, or leasers, make good wages following up the little stringers. There is a large amalgamation plant on the property, using Bryan mills, but it apparently did not prove satisfactory, as it is shut down. The deposit has been proved to be a large bed of mineralized quartzose rock, 100 ft. and more thick and extending right through the hill. Through this run the stringers of rich ore, but the whole mass may be treated as a low-grade deposit, and it is as such that the Green company intends to work it. With proper transport, the mine may be a big producer. Cyanide treatment is said to be contemplated.

The Cieneguita Copper Company at Chipiona (about 40 miles southeast of Sahuaripa), has a large plant, and the company owns a number of properties situated in the surrounding district. Among these is the Ostimuri group, which has been worked off and on for nearly 200 years. In 1715, 1820 and 1855 the most important efforts at work were made. The Cieneguita plant consists of four wood-burning reverberatory smelting furnaces, two reverberatory roasters and some 50 roasting stalls. A steam plant, gravity incline and several work shops are in operation. A large company store is also run. Half a million dollars (gold) is said to have been spent on the property. Over 7000 ft. of drifts are said to have been run and a large body of ore opened up. This mine is the best developed in the district and should soon be an active producer.

La Calera mine, run by the Garretson-Sahuaripa company, consists of a group of small workings in Batemote mountain about 30 miles southeast of Sahuaripa, and a plant on the creek below. The company has been experimenting with pyritic smelting of the arsenical ores, and, if successful will be able to do custom smelting and thus aid the district generally. It has a 29x48-in. water-jacket furnace. Charcoal and wood are the only fuels available, wherefore there has been considerable trouble. The furnace, too, is small for the troublesome character of the ore. About $80,000 (gold) is said to have been spent on the property. The ores are arsenopyrite with value chiefly in silver. The veins are along two nearly vertical dikes.

The San Eduviges mine, about four miles southeast of La Calera, has been worked for several years by a Mexican owner. An American company, the Trenton-Sonora Company, now owns it, and is developing it along more systematic lines. The ore contains *petanque*, and some of the ores are of high grade. Two adobe *vaso* furnaces are used. The ores are first hand-jigged to a high-grade product, then charged at the top of the inclined hearth in charges of about one *arroba* (25 lb.); fluxes of iron and silica are added by guess; and, after roasting, lead is added. When considerable leady material has collected in the cupelling hearth, and the copper and iron slagged off, an air blast is turned on and the lead oxidized off, leaving finally a *plancha* of silver weighing from 10 kg. upward. A ton per 24 hours is said to be the capacity under best conditions. This is of course a very wasteful method of procedure, but has the advantage of cheap equipment, and a product easily merchantable. The silver *planchas* are accepted as currency by the native merchants. The workings of the mine consist of a 200-ft. shaft with lateral drifts. A small hoist handles the ore and most of the water.

The mines of the western part of the district are of more recent development. The Anaconda and the Teopari may be mentioned as actively presecuting development; both of these are run by American companies. Numerous prospects exist, owned by Mexicans, but none is yet regularly producing.

The labor, available in the district, is of a very good grade for Mexico. Mining and a little cattle raising form the chief industries in the hills. The pay for Mexicans is usually $2 per day, some miners getting more, and some laborers as low as $1.50 per day of 11 hours. Much contract work is done, one mine paying $25 per ft. for a 5x7-ft. drift or shaft, in hard and poor breaking ground, no timbering being needed. This contractor pays 62½c. per ft. of hole drilled, either single or double-hand work, sharp steel being furnished by the contractor. About 6 ft. of hole per day of 11 hours is good work in the rock.

The hills are covered with a scattered growth of scrub oak, while the higher ranges furnish some fine pine timber. Cordwood costs $3.50 per cord of 125 cu.ft., delivered. Lumber varies greatly in cost. Some hand-sawn 9-in. boards cost 7c. per board foot. Very little timbering is needed in the mines and the buildings are generally of adobe or stone.

Most supplies at present are bought in Chihuahua. Dynamite, 40 per cent., costs delivered $24.60 per 50-lb. box. Steel costs from 55 to 70c. per kg. in small lots. Everything needful for home repair work must be brought in. Assay supplies must be in bulk and very complete.

It is practically necessary for every employer of labor to run a store; of the mining companies this is especially true. If properly run, the store will produce an important revenue without charging excessive prices to the workmen. The men are given *boletas*, or credit slips, on

which their time is entered in one column, and their purchases in another. Accounts are generally balanced every month. It is seldom that a Mexican with a family gets more than $5 cash at the end of the month, and at current prices the companies make from 30 to 40 per cent. profit on the actual cost of the goods; this does not include clerk-hire or maintenance costs. The companies thus save handling large sums of cash, which is hard and costly to procure. Living costs for, say, three Americans with a Chinese cook, are about $1 (gold) per person per day, all supplies furnished at cost. All money in this article, unless otherwise mentioned, is in Mexican currency. Prices quoted are subject to great variation and are only given as examples.

The district is a promising one, but needs large capital and plenty of time for development. It will be undoubtedly extensively developed in the next few years, and gives promise of several good producers, though it is too early yet to make a more definite forecast.

Tin in Bolivia

The idea is prevalent, says a correspondent of the London *Mining Journal*, that tin ore is superficial in Bolivia; only time will prove or disprove the correctness of that idea. In many cases up to the present such is not true. Be that as it may, if there is no further notable increase for some time in the output of Bolivian tin, it will not be through want of ore in the lodes, but through scarcity of labor. With the constant installation of new workings, the extensive railway construction, etc., men are more and more difficult to obtain. If capital is not forthcoming to make automatic appliances available, inside as well as on the surface of the mines this labor difficulty will be practically insuperable for some time to come. Taking into account the conditions—geographical, social, and political—of the country, the Bolivian mines are not likely to make any very appreciable impression, in the near future, on the price of bar tin.

AUTOMOBILING IN NEVADA

The Modern Substitute for the Concord Stage—Where They Are Run—The Routes, Distances, Times and Fares

BY CLAUDE T. RICE

When the first rush to the Comstock began, men on horse-back rode day and night from California so as to get there before the value of the sulphide ore became known to the miners working the placers in the Gold cañon and in Six-Mile cañon. And then began that rush of men on horse-back, mule-back, in stages, in ox teams and on foot which poured into that great camp. Later, similar rushes had Reese River, White Pine, Eureka and Pioche as their objective. It was much the same about six years ago when the rush to Tonopah began. True, a jerk-water narrow-gage railroad reached Sodaville, but from there on it was a horse-back ride, a stage trip or a dash by private conveyance. However, before long, some enterprising persons decided to try automobiles on the desert.

THE START FROM GOLDFIELD.

The automobiles proved a success and now the mine operator in the Nevada goldfields is not considered of much note unless he has his own automobile and driver. The latter is the democratic Nevada name for the chauffeur of the effete East. But what's in a name? His dignities and perquisites of office remain the same. He still does the bossing. The passenger pumps up the punctured tire after the driver has placed the new tube in it.

As I remarked above, almost all the mining men operating in the new Nevada on a large scale have their own automobiles. Speed is valuable in that land where minutes are sometimes worth dollars. At a moment's notice the motor is ready, and away its owner whirls across the desert to some new strike. He looks it over, decides what to do and is back again before his friends know he is gone and before they become suspicious of his absence.

Anyway, in a country where a saddle horse costs $5 a day and a two-horse team $10, one might as well have an automobile to travel in as to hire horses from livery stables. So instead of high-stepping horses, the streets of Tonopah and Goldfield boast numerous automobiles. In front of the Mizpah Hotel in Tonopah one will see almost every morning as many as eight or ten automobiles, some about to make their regular run to Goldfield or Manhattan, others waiting for parties which have chartered them for some trip, or else private machines waiting for mine operators who have put up at the hotel over night. The Concord stage coaches still run to the different camps, but what sluggards they have become since the automobile lines took away their prestige!

AN AUTOMOBILE TOLL ROAD.

The stage lines still carry the mail and some passengers, but most of their load often is only express packages.

The automobile transportation companies run motor-cars on regular trips, starting at a certain time, and maintain a fairly regular schedule both summer and winter (barring accidents). A new camp is found, and soon a company begins to run to it. As soon as it appears that the camp is going to be a good and permanent one, a toll-road is built for the exclusive use of the automobiles, thus doing away with the loss of time resulting from turning out for freight wagons, etc., which is necessary when following the wagon road.

A BREAKDOWN ON THE DESERT.

The desert valleys being fairly flat, and not much cut up by water courses, little grading is required to make these roads, it being necessary, for the most part only, to cut away the sage bush, and to level down the small humps and inequalities in the road. Men are kept working on these roads, filling in the ruts and holes which form, so that a considerable part of the company's revenue goes toward maintaining the road. Among the accompanying illustrations is shown the "gravel-car," made by remodeling a small automobile which once ran between Tonopah and Goldfield.

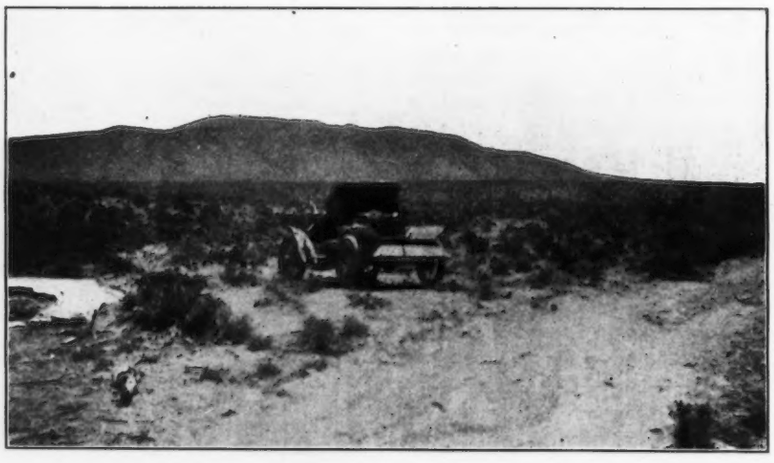
There are automobile companies running between Tonopah and Goldfield, between Tonopah and Manhattan, between Goldfield and Bullfrog, and between Hazen and Fairview. The fare is generally from 2½ to three times the stage fare. The rates and distances are given in the following table:

	Miles.	Fare.	Time.
Tonopah to Goldfield....	28	$5	1 to 1½ hr.
Tonopah to Manhattan..	55	20	3 to 4 hr.
Goldfield to Bullfrog....	70	25	4 to 5 hr.
Hazen to Fairview.....	60	20	4 to 5 hr.

The automobiles which are employed are generally 50-h.p. touring cars, and are of many makes, including practically all of the standard makes of gasolene touring cars. They carry generally from five to seven passengers, besides the driver, and each passenger is allowed 50 lb. of baggage, the baggage being carried generally on a boot fastened to the rear of the car. Each car carries an extra wheel, and several extra inner tubes. As the driver on the company motors is generally an expert mechanic, little time is lost on repairs on the road, as generally these consist only in mending a punctured tire or repairing a carbureter. All of the cars carry an African water bag, swinging from some part, for in Nevada one never voluntarily separates himself from drinking water. Many of the cars have covers, but the majority are uncovered.

Considering the fact that these are only ordinary touring cars, which are not designed primarily for desert travel, the automobiles do exceptionally well; the break-downs on the road are not very frequent. The company automobiles are overhauled after each trip, just as are the locomotives on a railroad, so such breakdowns as do occur on the road are seldom serious, although they are often vexatious; it surely is disgusting to be broken down in the middle of a desert, 20 or 30 miles from town.

Because of the automobile, journeying on the desert has lost much of its irksomeness. The trip is soon over, and with the company of a jolly crowd of passengers, the heat of the country, which is tempered by the speed of the car, is unnoticed; and above all, one escapes much of the dust, which renders a stage ride over the desert so highly uncomfortable. However, the traveler who patronizes the automobile in Nevada, will do well to provide himself with a tight sack in which to place his suit case or grip; for, owing to the boot being quite near the ground, the baggage becomes covered with a heavy layer of the fine desert dust, which sifts into the tightest suit case.



GRAVEL CAR ON AUTOMOBILE ROAD.

The Berg- und Metall- Bank

The Berg- und Metall- Bank, Aktiengesellschaft, has been organized at Frankfurt am Main with a nominal capital of 40,000,000 marks, of which 24,000,000 marks are fully paid, whereas of the remainder only 4,000,000 marks are paid in. The shares are of 1000 marks each and have been offered and subscribed for at 1100 marks, the premium of 100 marks per share being put aside as reserve fund.

The bank will transact every kind of banking and financial business but will direct its main attention to mining and metallurgical enterprises, and in particular to foreign and colonial mining and metal business.

The bank has taken over a portion of the business of Henry R. Merton & Co., Limited, of London, whose head and principal shareholder is Dr. William Merton, of Frankfurt. Dr. Merton is also the chairman of the directors and one of the largest shareholders of the Metallgesellschaft, and the Metallurgische Gesellschaft, of Frankfurt.

The head office of the bank is at Frankfurt am Main; the managing director is Walter Merton.

BORAX MINING IN CALIFORNIA

Surface Mining Replaced by Underground Mining—Extensive Area of the Deposits of Colemanite in the Mojave Desert—Methods of Mining and Treatment

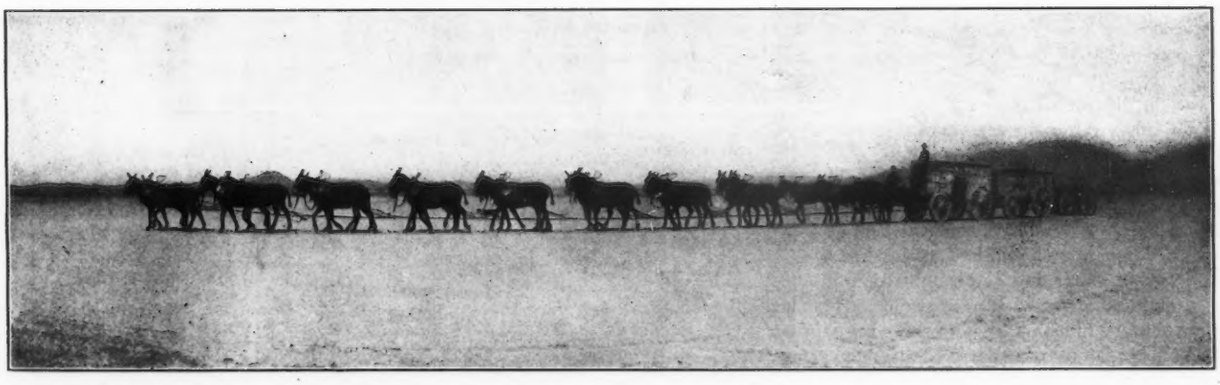
BY DAY ALLEN WILLEY*

One of the most interesting things in the American mineral industries is the method of procuring borax and the manner in which it is prepared to be utilized as a commercial product. It may be needless to say that the bulk of the borax now used in the United States comes from the Pacific coast, the principal deposits worked in recent years being found in San Bernardino, Ventura and Inyo counties in California. As San Bernardino and Inyo counties form a portion of the extreme southeastern section of the State, they include a very large area of so-called desert. Apparently borax ore of one description or another exists to a greater extent in the Mojave desert and its divisions than elsewhere in America, judging by the discoveries which have thus far been made.

In Death valley, which lies on the eastern border of the Mojave desert, marsh deposits of borax were discovered by F. M. Smith in 1872. For a number of years these deposits contributed the principal supply of borax utilized in this country. The borax was gathered by hand shovels and horse scrapers from the surface and partially refined at a plant located in the vicinity of Furnace creek, one of the few streams in this portion of the country. The fuel for the plant consisted of sage brush and what is known as desert wood, which was dug from beneath the surface. As the deposits were 165 miles from the nearest railroad line, large wagons drawn by strings of 20 or more mules were employed to haul the borax from the refinery at Furnace creek to the railway station known as Mojave. This was not only a very difficult but also a dangerous undertaking, for the reason that at only two or three places could water be obtained along the route and it was necessary to take a supply in a tank wagon. It may be said, incidentally, that these vehicles were remarkable for their size, as they weighed nearly four tons each, the top of the wagon box being 14 ft. from the ground and supported on wheels 7 ft. in diameter. Each wagon had a capacity for 12 tons of material.

The discovery of extensive underground deposits of calcium borate practically revolutionized the industry. The most extensive mine at present being worked is situated at Borate, in the southern part of the Mojave desert, 12 miles north of the Santa Fe Railroad. This deposit is named after its discoverer, W. F. Coleman. It yields a much larger proportion of boric acid than the incrustations in Death valley and elsewhere, and consequently the working of the deposits in the valley has been abandoned. The colemanite at Borate is developed by two shafts, which at the present time have been sunk 600 ft. below the surface, and levels opened from them. The shafts are equipped with cages operated by gasolene engines, each of 50 h.p. About 250 men are at present employed in the mine. The mining is done entirely by hand. The colemanite is obtained in lumps of various sizes, only a small percentage coming to the surface as fines. The mineral of lowest grade is sent to Marion, California, where it is calcined. The high-grade mineral and the product of the Marion plant are shipped to Bayonne, N. J., where the most complete plant in the world has been constructed for making this into borax. The first process in the treatment of the mineral is to run it through a crusher, which

HILLS AT BORATE, RYAN SHAFT AT LEFT, NO. 2 SHAFT AT RIGHT.

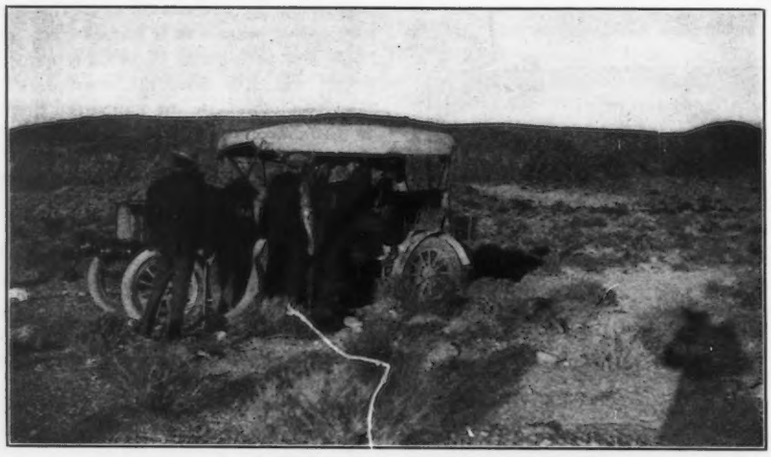


MULE TEAM PULLING OUT OF DEATH VALLEY.

*30 Porter building, Baltimore, Md.

The stage lines still carry the mail and some passengers, but most of their load often is only express packages.

The automobile transportation companies run motor-cars on regular trips, starting at a certain time, and maintain a fairly regular schedule both summer and winter (barring accidents). A new camp is found, and soon a company begins to run to it. As soon as it appears that the camp is going to be a good and permanent one, a toll-road is built for the exclusive use of the automobiles, thus doing away with the loss of time resulting from turning out for freight wagons, etc., which is necessary when following the wagon road.



A BREAKDOWN ON THE DESERT.

The desert valleys being fairly flat, and not much cut up by water courses, little grading is required to make these roads, it being necessary, for the most part only, to cut away the sage bush, and to level down the small humps and inequalities in the road. Men are kept working on these roads, filling in the ruts and holes which form, so that a considerable part of the company's revenue goes toward maintaining the road. Among the accompanying illustrations is shown the "gravel-car," made by remodeling a small automobile which once ran between Tonopah and Goldfield.

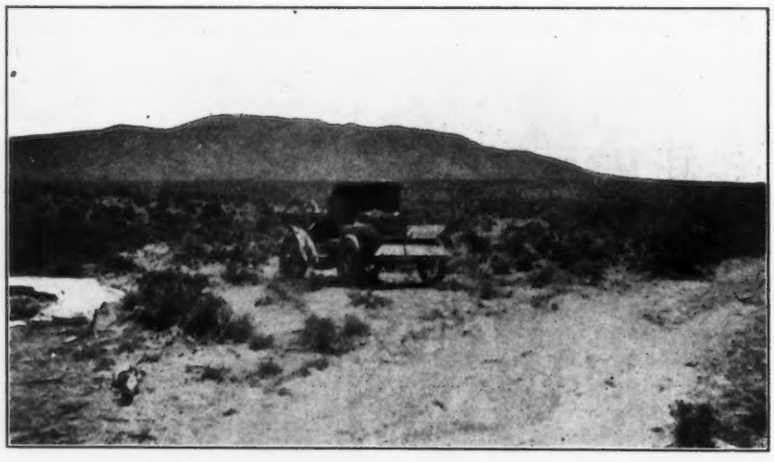
There are automobile companies running between Tonopah and Goldfield, between Tonopah and Manhattan, between Goldfield and Bullfrog, and between Hazen and Fairview. The fare is generally from 2½ to three times the stage fare. The rates and distances are given in the following table:

	Miles.	Fare.	Time.
Tonopah to Goldfield....	28	$5	1 to 1½ hr.
Tonopah to Manhattan..	55	20	3 to 4 hr.
Goldfield to Bullfrog....	70	25	4 to 5 hr.
Hazen to Fairview.....	60	20	4 to 5 hr.

The automobiles which are employed are generally 50-h.p. touring cars, and are of many makes, including practically all of the standard makes of gasolene touring cars. They carry generally from five to seven passengers, besides the driver, and each passenger is allowed 50 lb. of baggage, the baggage being carried generally on a boot fastened to the rear of the car. Each car carries an extra wheel, and several extra inner tubes. As the driver on the company motors is generally an expert mechanic, little time is lost on repairs on the road, as generally these consist only in mending a punctured tire or repairing a carbureter. All of the cars carry an African water bag, swinging from some part, for in Nevada one never voluntarily separates himself from drinking water. Many of the cars have covers, but the majority are uncovered.

Considering the fact that these are only ordinary touring cars, which are not designed primarily for desert travel, the automobiles do exceptionally well; the break-downs on the road are not very frequent. The company automobiles are overhauled after each trip, just as are the locomotives on a railroad, so such breakdowns as do occur on the road are seldom serious, although they are often vexatious; it surely is disgusting to be broken down in the middle of a desert, 20 or 30 miles from town.

Because of the automobile, journeying on the desert has lost much of its irksomeness. The trip is soon over, and with the company of a jolly crowd of passengers, the heat of the country, which is tempered by the speed of the car, is unnoticed; and above all, one escapes much of the dust, which renders a stage ride over the desert so highly uncomfortable. However, the traveler who patronizes the automobile in Nevada, will do well to provide himself with a tight sack in which to place his suit case or grip; for, owing to the boot being quite near the ground, the baggage becomes covered with a heavy layer of the fine desert dust, which sifts into the tightest suit case.



GRAVEL CAR ON AUTOMOBILE ROAD.

The Berg- und Metall- Bank

The Berg- und Metall- Bank, Aktiengesellschaft, has been organized at Frankfurt am Main with a nominal capital of 40,000,000 marks, of which 24,000,000 marks are fully paid, whereas of the remainder only 4,000,000 marks are paid in. The shares are of 1000 marks each and have been offered and subscribed for at 1100 marks, the premium of 100 marks per share being put aside as reserve fund.

The bank will transact every kind of banking and financial business but will direct its main attention to mining and metallurgical enterprises, and in particular to foreign and colonial mining and metal business.

The bank has taken over a portion of the business of Henry R. Merton & Co., Limited, of London, whose head and principal shareholder is Dr. William Merton, of Frankfurt. Dr. Merton is also the chairman of the directors and one of the largest shareholders of the Metallgesellschaft, and the Metallurgische Gesellschaft, of Frankfurt.

The head office of the bank is at Frankfurt am Main; the managing director is Walter Merton.

BORAX MINING IN CALIFORNIA

Surface Mining Replaced by Underground Mining—Extensive Area of the Deposits of Colemanite in the Mojave Desert—Methods of Mining and Treatment

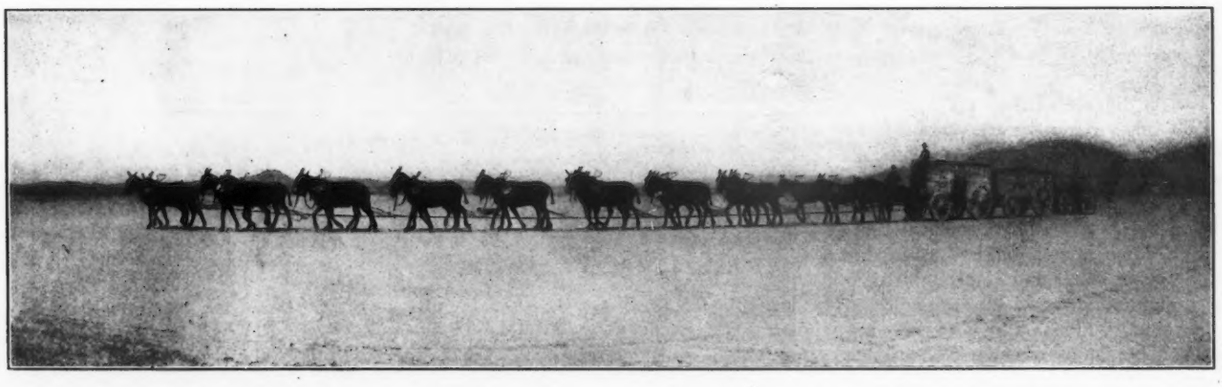
BY DAY ALLEN WILLEY*

One of the most interesting things in the American mineral industries is the method of procuring borax and the manner in which it is prepared to be utilized as a commercial product. It may be needless to say that the bulk of the borax now used in the United States comes from the Pacific coast, the principal deposits worked in recent years being found in San Bernardino, Ventura and Inyo counties in California. As San Bernardino and Inyo counties form a portion of the extreme southeastern section of the State, they include a very large area of so-called desert. Apparently borax ore of one description or another exists to a greater extent in the Mojave desert and its divisions than elsewhere in America, judging by the discoveries which have thus far been made.

In Death valley, which lies on the eastern border of the Mojave desert, marsh deposits of borax were discovered by F. M. Smith in 1872. For a number of years these deposits contributed the principal supply of borax utilized in this country. The borax was gathered by hand shovels and horse scrapers from the surface and partially refined at a plant located in the vicinity of Furnace creek, one of the few streams in this portion of the country. The fuel for the plant consisted of sage brush and what is known as desert wood, which was dug from beneath the surface. As the deposits were 165 miles from the nearest railroad line, large wagons drawn by strings of 20 or more mules were employed to haul the borax from the refinery at Furnace creek to the railway station known as Mojave. This was not only a very difficult but also a dangerous undertaking, for the reason that at only two or three places could water be obtained along the route and it was necessary to take a supply in a tank wagon. It may be said, incidentally, that these vehicles were remarkable for their size, as they weighed nearly four tons each, the top of the wagon box being 14 ft. from the ground and supported on wheels 7 ft. in diameter. Each wagon had a capacity for 12 tons of material.

The discovery of extensive underground deposits of calcium borate practically revolutionized the industry. The most extensive mine at present being worked is situated at Borate, in the southern part of the Mojave desert, 12 miles north of the Santa Fe Railroad. This deposit is named after its discoverer, W. F. Coleman. It yields a much larger proportion of boric acid than the incrustations in Death valley and elsewhere, and consequently the working of the deposits in the valley has been abandoned. The colemanite at Borate is developed by two shafts, which at the present time have been sunk 600 ft. below the surface, and levels opened from them. The shafts are equipped with cages operated by gasolene engines, each of 50 h.p. About 250 men are at present employed in the mine. The mining is done entirely by hand. The colemanite is obtained in lumps of various sizes, only a small percentage coming to the surface as fines. The mineral of lowest grade is sent to Marion, California, where it is calcined. The high-grade mineral and the product of the Marion plant are shipped to Bayonne, N. J., where the most complete plant in the world has been constructed for making this into borax. The first process in the treatment of the mineral is to run it through a crusher, which

HILLS AT BORATE, RYAN SHAFT AT LEFT, NO. 2 SHAFT AT RIGHT.



MULE TEAM PULLING OUT OF DEATH VALLEY.

*30 Porter building, Baltimore, Md.

reduces it to walnut size. From the crusher it passes to pulverizing mills, where it is reduced to a fine powder. It is then run through a series of buhr mills, similar to those employed in a flour mill, after which it is bolted through silk.

This milled product is placed in a hopper and mixed with carbonate of soda, and a certain quantity of water is added. The mixture is then heated by steam and agitated by paddles, which are mechanically revolved in the hopper. The result of this treatment is to combine the boracic acid contained in the mineral with the soda, the carbon dioxide of the soda combining with the lime. After the reaction has been completed, the calcium carbonate is allowed to settle and the solution of borax is drawn off and crystallized. The crystals, however, still contain a small percentage of foreign matter and are again dissolved by hot water and re-crystallized in vats containing wires which are immersed in the solution. This is the borax of commerce, although most of it is passed through pulverizing mills before it is sent to market.

The mine at Borate is connected with the Santa Fe system by a railroad 12 miles in length. Another very extensive deposit of colemanite has been found in the Amargosa valley, also in Inyo county. A railroad is now under construction from Ludlow, California, to this mine, which is to be worked on a very extensive scale, owing to the high grade of the mineral which it is known to contain. At present the bulk of the borax consumed in the United States is derived from Borate. The investigations which have been made in Death valley indicate that this region is probably underlaid with extensive deposits of colemanite, the mineral which is now being obtained coming from the outcrops of the beds.

ANOTHER VIEW OF THE MINES AT BORATE.

Gold and Silver Movement in Mexico

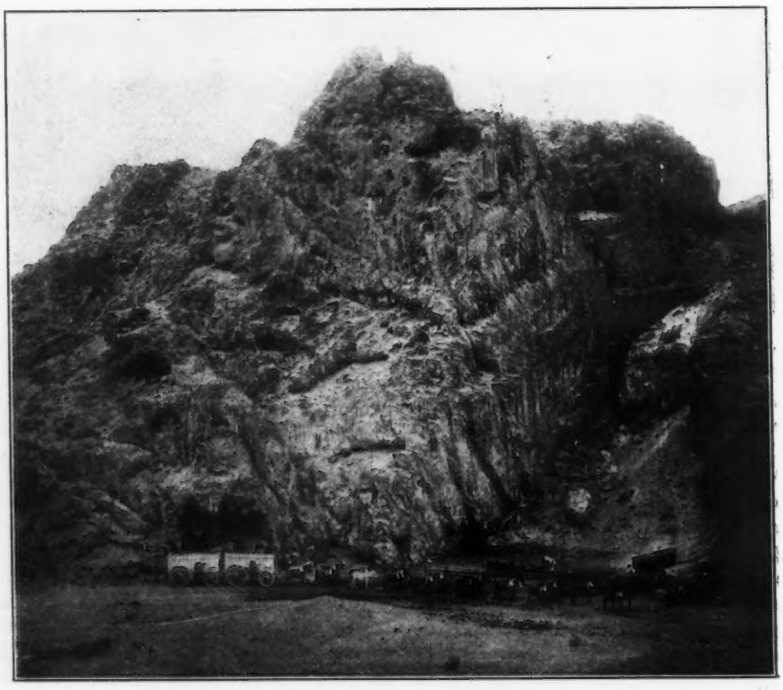
Mexico's exports of gold and silver during the fiscal years ending June 30, 1905 and 1906, are officially reported as follows, in terms of United States dollars:

GOLD:	1904-5.	1905-6.	Changes.
Mexican coin.	$90,518	$ 120 D.	$90,398
Other coin....	39,879	2,418 D.	37,461
Bullion.....	12,976.824	13 860,665 I.	883.831
Other forms..	1,073,719	1,984 695 I.	910,976
Total gold..	$14,180,940	$15 847.888 I.	$1,666,948

SILVER:			
Mexican coin.	$ 949,946	$24,835,512 I.	$23,885,566
Other coin....	38,986	61,727 I.	22,741
Bullion..	26,507 0 8	33 021,550 I.	6,514,542
Other forms..	5.265 883	4,781,253 D	484,630
Total silver.	$32 761,823	$62,700,042	I. $29,938,219
Total gold and silver.	$46,942,763	$78,547,930	I. $31.605,167

Returns from the Mexican mints are not yet available, so that the above figures do not permit any exact conclusions as to the country's total production of the precious metals. The coinage of gold has held fairly close to $500,000 per year, so that the gain of 11.7 per cent. in the gold export of the latter year may be taken as a fair measure of the growth of the gold-mining industry.

Conclusions deducible from the statement of silver exports, however, are less apparent. The gain of 91.4 per cent. in the latter year's total silver export is mainly constituted by Mexican silver coins, of which commodity the export during the year just ended was 26 times that during the preceding year, and by silver bullion, of which the increase was 24.5 per cent. Both of these great exports are the direct result of the recent adoption, by the Mexican Republic, of the gold monetary standard. The export of Mexican silver coins was further stimulated by the comparatively high price of silver prevailing within the last two years, which has given to the peso a market value, as silver, above its legal tender value. The Mexican authorities have taken advantage of this fact to market their accumulation of silver specie, and have been obliged to export it because the industrial consumption of silver in their own Republic is not large enough to consume it.



A STOP AT A WATER STATION.

THE MINING CAMPS OF SINALOA, MEXICO

General Geology of the State—Historic Mines—Silver Predominant

BY F. J. H. MERRILL*

The State of Sinaloa lies between the western ridge of the Sierra Madre and the Gulf of California. It has a length along the coast line of about 300 miles, extending from the Bay of Agiabampo on the northwest to the Rio de Las Canas on the southeast. Its breadth varies from about 135 miles at Topolobampo to about 55 miles near Mazatlan, and its area is estimated at 36,100 square miles. The country consists physiographically of two principal divisions, viz., a low Quaternary coastal plain, in places 40 to 50 miles in width, and a mountainous country eastward which forms the foothills and western slope of the Sierra Madre.

The rocks of the hill country are mainly crystalline and in them the Mexican geologists have recognized and mapped three principal groups of formations,[1] viz. (1) gneisses and crystalline schists; (2) granites, syenites, diorites and diabases; (3) rhyolites, trachytes, andesites, and basalts. In some of these rocks are mineral veins, which at certain points have been a source of wealth from a very early period. The rocks mentioned have different forms of mineralization, the younger andesites carrying chiefly veins of silver and the older gneisses carrying chiefly gold. This is also true in Sonora, Guerrero, and Oaxaca where these types repeatedly occur. The rhyolite and other rocks are apparently but slightly mineralized.

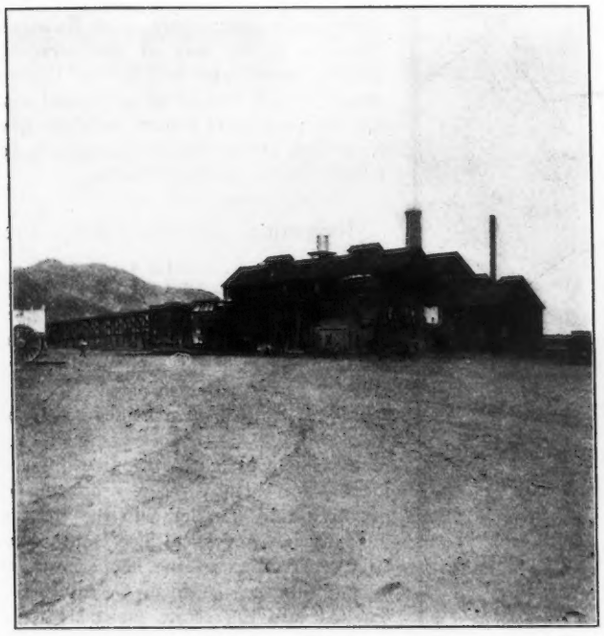
During the Spanish occupation, the Province of Sinaloa, as it was then called, was known as a region rich in silver. The *reales,* or mining camps, of Cosala, Copala and Rosario yielded large returns in silver to the Crown. Copala and Rosario are still productive, though Cosala is not now so prominent. Rosario is still a rich center of mining operations and is well known through the mines El Tajo and La Guadalupana. At Copala is the property of the Felton-Copala Mines Company, Ltd., a British corporation, in which a large interest is held by Charles Butters, of San Francisco, who has recently completed there a large cyanide plant, similar to that at Minas Prietas, Sonora. This plant was erected mainly to treat an immense quantity of low-grade ore in the dumps of the old Felton mines, but it is reported that some of the veins in the neighborhood will still be worked. A little east of Copala is Panuco, where is also a group of silver mines of some importance. Other well known mines are at Plumosa and San José de Gracia. The accompanying map shows the location of the more important mining camps.

The following is a list of mining camps in Sinaloa from the map of Antonio del Castillo published in 1893. The names in italics are listed by Humboldt as being active in 1804. A similar map of smaller scale was published by Dr. Salazar in the *Trans.* Am. Inst. of Min. Eng. for 1902, but it is not so complete.

Aldamas, *Alisitos,* Bacubirito, Barranca-Honda, Barrateros, Boleo, *Cajon,* Candelero, *Carcamo, Copala, Cosala,* Cuña, Descanso, Encanto, Joya, Las Havas, Macochin, Matatan, Palmillas, Palo Blanco. *Panuco,* Placeres, Platanos, *Plomosos, Reyes, Rosario,* San Cayetano, San Ignacio, *San Jose de Gracia,* San Jose de Las Bocas, *San Lorenso,* Santa Cruz, Santa Maria, *Sibirijoa,* Silla, Tachichitle, Talagua, Talyotita, Tanecapa, Tepeca, Tepentaca, Tepucha, Yecorato, Yedros, Zaracoza.

Humboldt enumerates many other camps not mentioned by Del Castillo. A list of these is as follows: Agua Caliente, Ajuntas, Apomas, Bacatopa, Charcas, Corpus, Jocuistita, Limon, Loreto, Los Molinos, Monserrate, Norotal, San Juan Nepomuceno, San Roque, Santa Rosa, Santa Rosa de Las Lagunas, Santiago de Los Cavalleros, Surutato, Tabaliñeto, Tenoriba.

The camps mentioned by Humboldt are nearly all located on his large map of Mexico, scale 56 miles to the inch, in the atlas accompanying his "Essai Politique sur Le Royaume de la Nouvelle Espagne," but the locations are generalized, and so independent of topographic detail that they cannot from that source alone be accurately located on a modern map. The "Carta Minera" of Antonio del Castillo, while of great value, is also incomplete, so that we must await the publication of more cartographic information before a complete map of the mining camps can be prepared. The base of the map accompanying this article was prepared from that of Gen. Carlos Pacheco, published in Mexico in 1890. That of Señor del Castillo is on the same scale, viz.; 1:2,000,000, equivalent to about 32 miles to one inch,



Roaster at Marion.

Deserted Town of Calico.

BORAX MINING IN CALIFORNIA.

*Mining geologist, 225 West End avenue, New York City.

[1]See geologic map of Mexico, 1897, *Boletino* del Instituto Geologico Mexicano.

but does not correspond in the location of some places of importance. Some locations on the Castillo map differ from the corresponding ones on the Pacheco map by 20 to 30 miles. It is therefore not practicable to transfer locations from one map to the other.

The mines of Sinaloa are largely productive of silver, though in some gold predominates, and in a few gold is practically exclusive, as at Realito and Boleo. Copper has not yet been developed in Sinaloa, though outcrops of cupriferous deposits have been found at several points.

Sinaloa is a better watered country than Sonora, and consequently is more abundant in timber for mining purposes. In the vicinity of the older mining camp the wood has been cleared off from some distance, but labor and transportation are not high, and the mountain forests have large reserves of material. Water in some of the rivers can be made a source of power for mining operations. Labor is less expensive and more abundant than in Sonora, and the lack of railroads is the only present obstacle to the development of a large mining industry. While the summer climate of the coast is hot and enervating at the elevation of 2000 to 3000 ft., at which many of the mining camps lie, the air is bracing and the temperature wholly endurable.

MAP OF SINALOA AND PART OF DURANGO.

Improved Traveling in Mexico

The Mexican Central railway has completed its connection between Monterey and Saltillo, and regular daily trains are running over that line. Monterey has now two railroads connecting it with Saltillo. It is stated to be the purpose of the Mexican Central road to run through trains daily, in the near future, from Saltillo to Tampico, by the way of Monterey, and each of these trains will have a Pullman sleeper, which will afford additional comfort for passengers coming on ships from New York by the way of Tampico, bound for the interior of the Republic.

Mechanical Charging for Zinc Retorts

The Biache Saint-Vaast Smelting Company, of Paris and Belgium, has patented an apparatus for mechanically charging zinc retorts (British patent No. 99 of 1906). It consists of a hopper supported on a carriage, the hopper being movable in a plane perpendicular to the front of the furnace. The carriage itself runs on overhead rails parallel with the front of the furnace. A vertical pipe comes down from the bottom of the hopper, terminating with a tee. From the tee a long pipe extends into the retort which is to be filled. The other branch of the tee is fitted with an injector, connected with a supply of steam or compressed air. The arrangement is such that the charge for the retort can be blown directly into the latter in much the same way that a powdered coal is injected into a cement kiln.

The London *Engineer* cites as an evidence of the progress made by the German iron industry the fact that the number of the workmen has not risen in proportion to the increase of the production. In 1895 the production amounted to 5,500,000 tons, and the workmen numbered 24,059; in 1904 the production had risen to 10,000,000 tons, and the number of the workmen only to 35,284. In 1895 the quantity produced per workman employed amounted to 227 tons; in 1904 it had risen to 283 tons. Thus, the number of workmen increased during the decade by 47 per cent., while the quantity produced increased by 84 per cent.

El Oro mine, of Mexico, in the year ending June 30, 1906, treated 234,079 tons of ore, valued by assay at $2,640,994, for a recovery of $2,243,168, or 85 per cent., at a total cost of $5.73 per ton.

LIGNITE BRIQUETS

An Important System for the Utilization of Low-Grade Coal that is now Being Extensively Used in Germany

BY ELWYN WALLER AND H. STANLEY RENAUD*

Mulvaney, after being chased by "My Lord the Elephant," said: "The seat of my trowsers, where I made sure he would take holt, was crawlin' wid—wid invidious apprehension." "Invidious apprehension" most nearly describes the recent state of mind of many of our manufacturers and other users of fuel. Relief from a dependence on the outcome of controversies between operators and miners is longed for, and various ways of obviating this difficulty have beeen sought. Perhaps the most efficient way of becoming independent of the coal barons and the "John Mitchells" is in the use of fuel oil under boilers; but the great difficulty here lies in the expense of making the necessary changes in the heating apparatus. The alternative seems to lie in the direction of briquetted (or, as the English term it, "patent") fuels. The term, being French, suggests a French origin for the article, but so far as is known briquetted fuels really had their origin in England. We have reference to the general subject of briquetting of fine coal, slack, culm, coke breeze, etc., as a way of utilizing the waste products of coal mines, coal-washing plants, coke ovens, etc.; but as this branch of the subject is already rather familiar to many technical men, we will confine ourselves to the somewhat new field, in this country, of the manufacture of commercial briquets from lignite material as it comes from the mine.

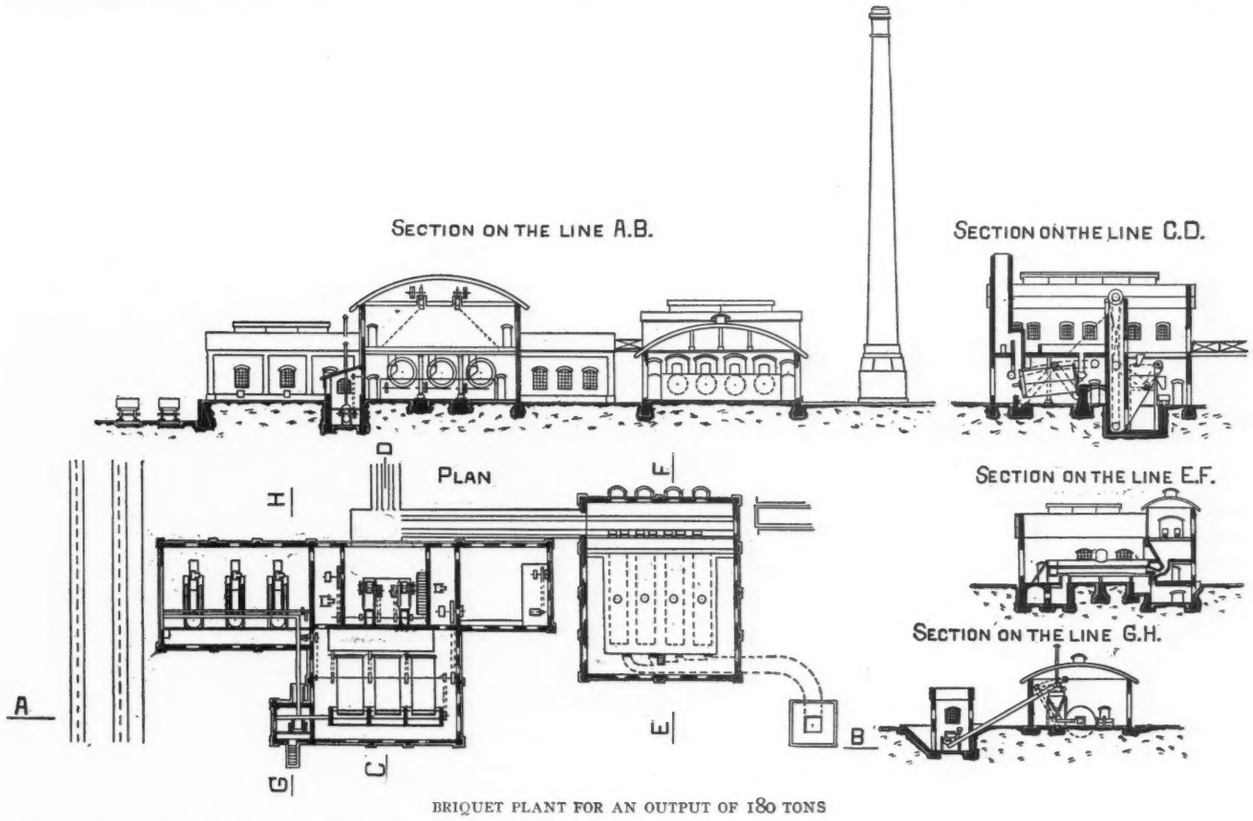
It is a fact of common note that enormous beds of lignite occur in various parts of our country, and that, too, in sections where anthracite and bituminous coals are not to be obtained except by importation from distant States, and consequently at a greatly increased cost. The utilization of these large quantities of combustible material in the lignitic form has been the dream and ambition of many far seeing men, but owing to its high content of water and the expense of making the lignite into briquets by the ordinary methods, the development of these properties has been at a practical standstill. Under conditions where "Necessity was the Mother of Invention," the Germans have fully developed this branch of industry, and have put it upon a firm and practical basis, and Americans seeking to develop such properties will do well to follow their lead.

This article is presented with a hope that it may show interested parties the present condition of the manufacture of lignite briquets.

HISTORICAL.

It is readily perceived that quite early in the history of industrial operations, it may have been observed that certain materials in a more or less subdivided condition could be more advantageously utilized if compacted into comparatively large lumps; and that some means for accomplishing that end would be devised. The snow ball may have suggested the first briquet. If, as is frequently the case, the material in itself contained nothing to afford the necessary coherence, some "binder" had to be added. The use of mechanical pressure to compact the masses into firmer form would be a natural step, and thus we can understand how what is now called briquetting might have been practised for some time before it received special mention.

It has been asserted that fuel briquetting originated in China. Reference has been found in English literature to the manufacture of "cole balls" in Germany in 1594, and later in Belgium and in France. The beginning of the industry has been frequently attributed to England, and there is some evidence that it was known in the time of Queen Elizabeth. Wormald states that the first published specification relating to fuels of this character, in the English patent office records, is dated April, 1773. Björling gives the following



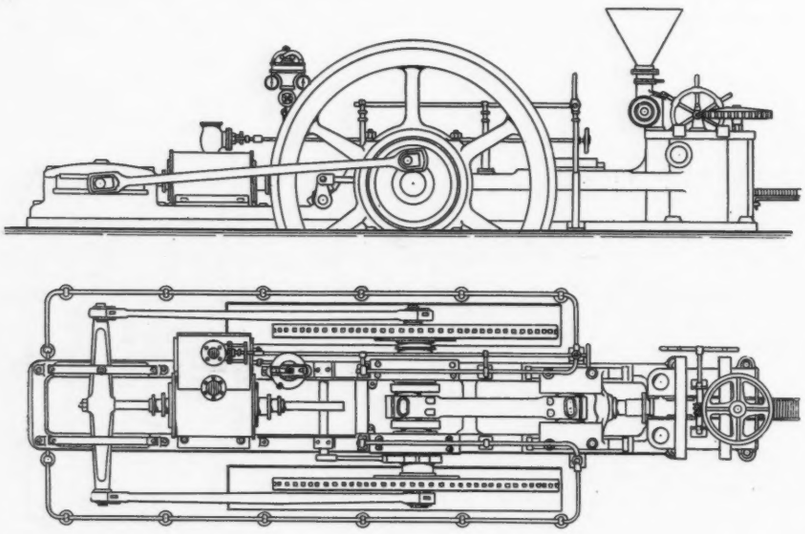
BRIQUET PLANT FOR AN OUTPUT OF 180 TONS

*Consulting chemists, 159 Front St., New York.

dates for the first coal-briquet factories: France, 1842, at Berard near St. Etienne; England, 1846, at New Castle on Tyne; Belgium, 1852, at Montiguy sur Sambre; Austria, 1858, at Brandeist near Prague; Germany, 1861, at Mulheim on the Ruhr.

MATERIALS AND METHODS.

Of materials proposed or used with the coal, either for the purpose of utilizing waste products as tan-bark, sawdust, etc., or to serve as binders, the list is of formidable length. Among what we may term additions it includes all kinds of refuse products, some of them (as "broken glass") not combustible. Among the binders the range is also very wide—cow dung, loam, molasses, refuse products containing starch, gutta percha and portland cement may be mentioned to illustrate the variety. It is amusing to note that many



SINGLE BRIQUET PRESS.

of the materials described in the earlier patents are claimed as novel additions in several of the comparatively recent specifications. As a fact, the principal binders now used are of the pitch order—coal-tar pitch, petroleum-residue pitch, or, in some cases, tars before distilling down to pitch.

The formation of blocks, or briquets, necessarily involved the devising of machinery for compression, and much ingenuity has been applied to that branch of the industry. Two classes of presses have come into use: (1) The closed mold—in which the block is formed and compressed—and then discharged as finished (one pressing). (2) The open mold—in which the blocks are formed as in the first case, and then discharged into a channel or mold form in which they are subjected to further pressings before being discharged. The closed mold is better adapted to materials to which a binder has been added, as anthracite slack, etc. For the briquetting of lignite and materials of the sort in which binding properties may be developed by such treatment, the open mold is advantageous. To drive such presses, more power is usually required. The principle of the open mold was first introduced by Postrat Exeter in Bavaria (1850) who applied it to peat. The manufacture of lignite briquets, without addition of binder, was, it is said, first accomplished in Ireland.

RAW FUELS.

In general terms, the progressive changes in vegetable matter when deposited in the beds where they are now found would be represented by (1) Peat, (2) Lignites or brown coal, (3) Bituminous coal, (4) Anthracite. The lines of demarcation between these stages are by no means sharp, and much study has been given to the question of defining them accurately. As a rule, the peats show a more open texture, and indication of cellular structure. With lignites, the alteration has progressed farther and in many cases the vegetable structure is obscure. The lignites, however, usually come from a different order of plants. When heated or subjected to destructive distillation, lignites afford (besides gaseous products) substances more or less resinlike. The same treatment of bituminous coals gives condensable material more of the oily or tarry character, and there are all grades between. As the fuel approaches nearer in character to anthracite, products of distillation diminish, until from clear anthracite practically no condensable products are obtained.

BRIQUET FUELS.

The briquets made from coal slack or culm with the usual pitch binder are called in Germany "Industrial Briquets," being unsuited for domestic use on account of their odor and other undesirable features, but well adapted for use under boilers in manufacturing operations where the odor and dirtiness in handling do not constitute an objection.

By direct application of heat, or by generating heat in the mass by means of pressure, lignites can be made to develop resinoid material which will serve as a binder for the briquet blocks. Made in this way there are advantages derived from the avoidance of special mechanical treatment to incorporate the binder, also the blocks are clean and odorless when handled or when burning, which adapts them for domestic purposes. Indeed they are so clean that the suggestion has been made that they might be used for paper weights.

The special treatment necessary to develop the binding qualities of a lignite varies somewhat with every different deposit, and hence the mode of handling must be studied out in each particular case. The size of the particles, the degree of dryness, the temperature when going to the presses, are all elements in the problem.

GERMAN BRIQUETTING INDUSTRY.

In the following description of the processes used in Germany for the treatment of lignites, details regarding the extraction from the beds are necessarily omitted, and we start with the material as delivered at the factory. To show the main features of the industry at the present time, the description is made somewhat general.

Aside from operations of a more or less tentative character, the establishment of an Exeter press for peat briquetting at Haspelmoor in Bavaria and another at Halle, a. S., for lignite briquetting in 1850 were practically the beginnings of the industry in Germany as it exists today. The industry has been chiefly developed in Saxony, Brunswick and the vicinity of Cologne on the Rhine. Besides what is supplied to the home market, considerable quantities of the product are now shipped to adjacent countries—Belgium, Holland, France and Switzerland.

In the original condition as mined, lignite is an inferior fuel, and does not stand transportation well. It dries out and "slacks" as it is termed, because the superficial cracking up of the lumps as the moisture escapes resembles the cracking of lumps of quick-lime when moistened. Its inferior quality as a fuel renders it unprofitable to ship it far from the point of extraction. The briquetting factories are therefore most advantageously located near to the lignite beds.

PREPARATION OF THE LIGNITE.

The freshly extracted lignite is likely to contain nearly 50 per cent. of water. To prepare it for pressing, the most of this must be removed. In the pressing operation decided heat is developed. This brings the resinous contituents to the point of melting, when they act as a natural binder, and in conjunction with the high pressure employed afford a firm and solid block. If the lignite contains too much water at this stage, the moisture evaporates after expulsion of the block from the

press, and the briquet bursts open. If the water content is too small, the resinous constituents become overheated, lose their binding power, and the block falls to pieces on leaving the press.

When we consider that from every 100 lb. of raw lignite some 40 lb. of water must be evaporated, it is perceived that artificial heating is necessary, and, moreover, that the drying process is one of the most difficult and costly parts of the treatment. In addition to the driers and presses, conveyors are necessary, so that a plant requires a rather extensive boiler power.

To obtain a satisfactory briquet the lignite must be broken to a fairly uniform size. Grinding should be avoided, as that produces too much dust in the subsequent drying process. The lignite, brought from the beds by belt or other conveyor, is delivered on a screen with mechanical feed. The fine coal goes direct to an elevator while the coarser pieces are run through a roll crusher and the screened material taken by elevator to the coal floor. Especially large or tough lumps may need a preliminary run through an extra breaker. Bits of wood or other material are separated and used for fuel under the boilers. The coal floor on which the screened material is delivered needs to be capable of accommodating twice as much as will suffice for one day's run.

DRYING.

From the coal floor, the prepared lignite is conveyed automatically to the drier placed below. Of the numerous forms of drier which have been introduced, two types are regarded as equally good, the Schultz tubular drier, and the plate drier. The cleaned coal which contains about 50 per cent. of moisture must be dried down to about 15 per cent. Hence from 100 lb. of coal, 41.2 lb. of water (about 5½ gal.) have to be removed. Therefore, to turn out a ton of briquets one must prepare and handle 3400 lb. of raw material, since 1400 lb. of water (about 70 gal.) have to be evaporated. This suggests the high evaporative capacity required of the drier. The drier is heated by the exhaust steam from the conveying and pressing machines. If that does not suffice, steam direct from the boiler must be used. The Schultz tube drier consists of a rotating cylinder fitted with tubes like a tubular boiler, set in an inclined position with hollow trunnions, through the upper one of which steam is admitted. Through the lower one the condensed water passes off. The comminuted coal is fed into the tubes at the upper end, and by gravity and the motion of the cylinder is gradually conveyed to the lower end from which it is discharged as dry as the requirements of the case demand.

The plate drier consists of a series of hollow iron plates 15 ft. or more in diameter, arranged one above the other, the whole encased in masonry and covered with a spherical roof. Steam is admitted into the hollow interior of the plates. In the center revolves a vertical shaft with arms carying rabbles which turn over and shift the coal on the plates. The coal is fed on the top plate, over which the plows are so set as to spread the material toward the periphery. There it drops through holes onto the plate below, where the plows move it toward the center, where it falls onto a third plate arranged as the first one for centrifugal distribution, and so on until it is discharged from the last plate dried to the proper point. Dust chambers are connected with the driers to retain and utilize the dust.

PRESSING THE BRIQUETS.

If the driers are directly over the briquet presses, the dried coal may be run by gravity into the press hoppers. This is the most direct method, but it has been found in many cases that it is advantageous to mix and cool off the material before pressing. Under such conditions the drier may be located on the ground floor, and the dried coal raised by bucket elevators to the hopper of the briquet press.

The Exeter presses, which are quite generally used, have each their own engine, the press and engine being united in one mechanism. The principle in pressing consists in applying repeated shocks or blows to a mass of the dried coal through a press mold, the cross-section of which gradually diminishes in area. At the back stroke of the machine, a definite quantity of the coal is delivered in front of the plunger to which a reciprocating movement is imparted by the engine. The cross-section of the plunger has the elliptical form of the face of the briquet. By the forward motion of the plunger, the block is formed, and then driven into the mold. The mold form is about 1 m. long, and will hold 30 briquets. Each successive briquet is pressed into the form, crowding the whole series forward by the thickness of one briquet. Thus each briquet is subjected to about 30 blows, and with each blow the cross-section is diminished. The resulting friction of the briquets against the sides of the form develops so much heat as to melt the resinous constituents of the lignite, which, under this heavy pressure, act as a binder. The direct resistance of the series of briquets which the press plunger has to overcome amounts to 10 tons per sq.in. of plunger surface. This shows the great strength required in a briquet press.

YIELD OF BRIQUET PRESSES.

One back and forward movement of the press plunger corresponds to one revolution of the engine. At every revolution one briquet block is made. Thus far, three sizes of presses have been put on the market. The smallest manufactures 30 tons, the medium 40 to 50 tons, and the newest and strongest 60 to 70 tons of briquets every 24 hours. The last named presses make 100 revolutions or more per minute, manufacturing blocks of 1 lb. or more each. Hence in a day's run of 20 hours, we would have $100 \times 60 \times 20 = 120{,}000$ lb, or six "double carloads" as the Germans estimate it. In manufacturing smaller and lighter briquets the gross weight of the output is diminished, whereas in manufacturing the heavier briquets it increases.

LOADING THE BRIQUETS.

The briquets are discharged from the presses in a continuous column. This column is carried by means of iron chutes to a car ready to receive them, in which a man takes them up in rows, and packs them systematically in layers. The briquets forming the column do not stick tightly to one another; a slight blow suffices to separate them.

Being uniform in size and shape the briquets can be symmetrically stacked like so much lumber, or packed solidly in cars or compartments without the necessity for bins or bunkers, as are required by ordinary coal. The cost of packing or stacking has been found to be more than offset by the advantage of close packing and obviation of strongly braced partitions.

Well made lignite briquets will burn without giving much, if any more, smoke than is afforded by anthracite coal. The heating power is but little inferior to that of a good grade of coal. Industrial briquets, as fast as made, are discharged by a chute directly into a car and the labor and consequent cost of packing is dispensed with.

ESTIMATED COST.

The following approximate estimates have been taken from the statement of a German manufacturer of machinery, converting the prices, weights and measures into our own units. At best they can be only approximate, and are only intended to be adapted to conditions prevailing in Germany. The estimates are for a run of one year, assuming it to comprise 300 working days.

Number of presses...	2	3	4
Tons per day of 24 hr.	120	180	240
Tons per annum.....	36,000	54,000	72,000
Raw lignite, cu ft. per annum.....	5,000,000	7,000,000	10,000,000
Capital Invested.			
Machinery.....	$55,000	$70,000	$85,000
Buildings.....	25,000	30,000	35,000
Working capital.....	18,750	21,250	25,000
Investment.....	$98,750	$121,250	$145,000
Running Expenses.			
Cost of lignite, $0.00864 per cu.ft.....	$43,200	$64,800	$86,400
Salaries and wages...	5,275	6,825	7,412
Repairs.....	750	1,125	1,500
Lubricants and supplies.....	375	500	750
Taxes, etc.....	750	1,125	1,500
Machinery depreciation, 10%.....	5,500	7,000	8,500
Buildings depreciation, 5%.....	1,250	1,500	1,750
Aggregate cost.....	$57,100	$82,375	$107,812
Returns.			
Tons of briquets.....	36,000	54,0007	2,000
At $2 per ton.....	$72,000	$108,000	$144,000
Deduct cost.....	57,100	82,375	107,812
Profit.....	$14,900	$25,625	$36,187
Per cent. profit.....	About 15	About 21	About 25

SUMMARY.

The importance and bearing of the pre-

ceding sketch may be appreciated when we consider the resources of our own country (as yet almost entirely undeveloped) in respect to lignite and fuels of that class. Briquetting has attracted some attention in the United States, but as yet the industry is rather in a tentative stage.

An inspection of the map accompanying the report of the coal-testing plant of the United States Geological Survey at the St. Louis Exposition shows that there are deposits of lignite and lignitic bituminous coals of the Cretaceous formation in the valley of the Mississippi, extending east and west from Indiana to Kansas, and north and south from Iowa to Middle Texas. Besides this, deposits of similar character occur in various places in the Rocky mountains. In North Dakota, Montana and the north-eastern portion of Wyoming there is a large field of lignite covering some 55,000 square miles, the seams ranging from 20 to 80 ft. thick. All of these are in the Cretaceous formation. The Tertiary also shows beds of lignite in Alabama, Mississippi, Arkansas, Louisiana and southern Texas, besides several spots on the Pacific coast.

Some time ago samples of lignite—both from North Dakota and Alabama—were sent to Germany and there successfully briquetted without the use of binder. More recently the trial has been repeated with the same results. The opinion has been expressed that those lignites could be put into briquet form at a cost not exceeding 50c. per ton.

The advantages claimed for briquetted fuel may be here enumerated: (1) Diminished freight rates, especially for water shipments. (2) Freedom from shifting on a rolling vessel. (3) Exemption from spontaneous combustion. (4) Exemption from pump-clogging on board ship. (5) Diminished insurance rates on the fuel. (6) Diminished insurance rates on the vesels carrying briquets. (7) Less deterioration from age and weather. (8) Convenience in checking the quantity delivered, by count or by measurement. (9) Convenience in varying the amount of each size delivered. (10) Freedom from smoke; of especial advantage for the navy in war time. (11) Ability to "blend" material from different veins. (12) Ability to keep a reserve against strikes. (13) Opportunity for advertising by impressions on each briquet. (14) Guarantee of quality by the trade-mark impression. (15) Increased regularity in firing. (16) Ability to regulate size of output. (17) Utilization of waste products. (18) Preservation of size and shape in handling and shipping. (19) Cleaner decks, etc., on board ship. (20) Coaling less disagreeable. (21) Grade of fuel, especially with lignite, may be raised without a mixture of other fuel.

The gas producer offers one solution to the problem of utilizing lignite and other low-grade coals.

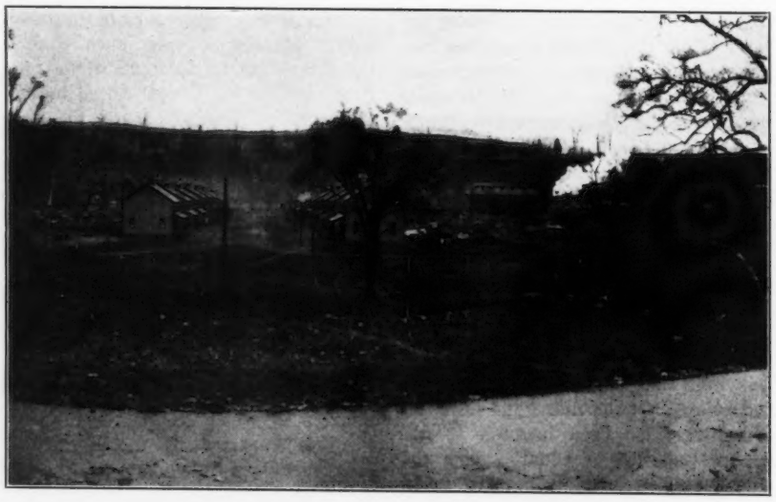
CONSOLIDATION OF FIVE LARGE COAL MINES

Probable Output of Million and a Half Tons Annually—About Five Thousand Acres Controlled in the Pittsburg Gas-Coal District

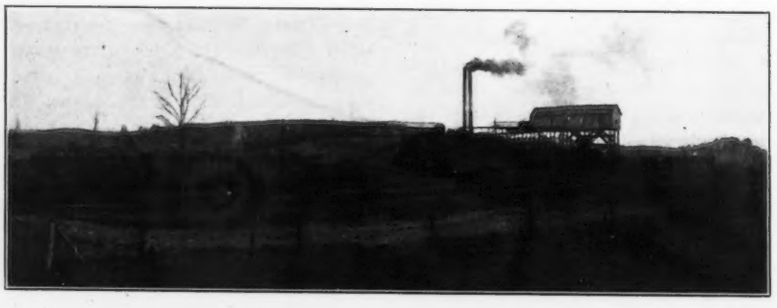
BY J. LEGGETT PULTZ*

The Pittsburg & Westmoreland Coal Company was recently formed by the consolidation of five large and well known mines in the Pittsburg district. The amalgamation of these properties makes the new company one of the largest independent producers of gas coal in western Pennsylvania. The five operations are the two mines of the Hazel Kirk Gas Coal Company, the Penn-Manor Shaft Company, the Shoenberger Coal Company and the Pittsburg & Westmoreland Coal Company, all of which are included under the head of the new Pittsburg & Westmoreland Coal Company. The merged properties were all operated in close harmony, and practically under the same management for some time previous to the combination, so that no changes have occurred in this respect. This merger practically clears up the greater part of the remaining high-grade Pittsburg coal, outside of the extensive holdings of the Pittsburg and several other large coal companies.

The mines of the Pittsburg & Westmoreland Coal Company are located in what is known as the gas-coal zone, running northeast and southwest, intersecting the Youghiogheny and Monongahela rivers, and containing the Pittsburg seam, noted in this zone as a high-grade gas coal. This zone, or basin, is limited in area, and, owing to the thickness and quality of its coal, possesses many features which together assure a high economic efficiency in the cost of production. A considerable quantity of the acreage held by the Pittsburg & Westmoreland Company is located within the limits of the thick seam mining rate, which is from 8 to 10c. a ton under the rates governing the greater part of the Pittsburg seam. The company holds about 5000 acres of land, and the total output of the five mines should amount to over a million and a half tons annually.



HAZEL KIRK NO. 1.



PITTSBURG & WESTMORELAND MINE

*Consulting mining engineer, 71 Broadway, New York City.

At the No. 1 and No. 2 openings, located at Hazel Kirk and at the Penn-Manor mine, the coal has been reached by shafts; Shoenberger is a drift mine; and Pittsburg & Westmoreland is operated by a slope.

The Shoenberger mine is located on the river a short distance below Monongahela City. It is well known as one of the largest producing mines in western Pennsylvania. The mine has been operated for a number of years, and the workings are extensive, permitting of a very large output and proportionate low cost of production. At Shoenberger, the coal lies in the hills outcropping at some little distance above water level, and in consequence the workings are all reached by drifts. The present operations are on the P. V. & C. railroad. The location of this mine gives it the most advantageous freight rates to all the industrial plants of the Pittsburg district, and the Mahoning and Shenango valleys, besides many points on the Great Lakes and in Canada, and practically the entire West and Northwest.

The method of mining the coal at the Shoenberger mine is shown in the accompanying plan of the mine workings. This system of mining may be taken as an example of the general practice of extracting coal in the Pittsburg district.

The location of the Shoenberger mine gives it exceptional transportation facilities by either rail or water. From the drift mouth it is a very short haul to either the railroad or the river tipple. Both tipples are equipped with the most efficient machinery for the rapid loading of railroad cars and river flats, and every precaution is taken to eliminate the breaking of the coal. The company owns flat-boats and sends a large quantity of its coal in this way to the wharfs at Pittsburg. The surplus slack is stored in a bin, which is filled by means of a conveyor carrying the slack direct from the screens.

The equipment of this mine is entirely modern. The power plant consists of three Erie City boilers and feed pumps, two 150-h.p. Erie City engines, and two 150-kw. Morgan-Gardner generators, driven by belts. The underground haulage is accomplished by three 8-ton electric mine locomotives, also of the Morgan-Gardner type. The Morgan-Gardner chain machines are used for mining the coal. The workings are ventilated by means of an 18-ft. Vulcan fan, operated by a 12x24 engine of the same make. Triplex and centrifugal electric pumps are used underground.

The Penn-Manor mine is located on the Manor Branch of the Pennsylvania Railroad. It was formerly the Penn-Manor Shaft Company. The mine has been operated for a number of years, but the output never reached large proportions until the present management acquired the property and made the necessary improvements and development work that has brought about the present large daily tonnage. The Pittsburg seam at this locality lies about 219 ft. below the surface and has been reached at this mine by means of a shaft, the cage of which is oprated by one pair of 20x36-in. Dickinson double-drum hoisting engines. Besides the shaft there is a slope 550 ft. in length. The power house contains four Mulholland single-flue boilers, and two Erie City tubular boilers. Erie City engines drive the generators, which are of the Morgan-Gardner type. A 20-ft. Vulcan fan supplies air to the underground workings. The fan is driven by a 60-h.p. Vulcan engine and the whole is installed in a separate fan house. Electric pumps with 5-h.p. motors are used underground. Besides the six pumps of this variety, there is one 10x24x36-in. Togue pump, one 14x20x24 Blake, one 6x8x10 Cameron, and one 12x24x30 Youghiogheny pump. Morgan-Gardner chain machines are in use for undercutting the coal and the same make of electric mine locomotive is operated on the main haulage roads. The boiler house is constructed of brick. There is also a blacksmith shop and a fully equipped repair shop. A slack elevator run by a 22-h.p. motor takes the surplus slack from the screens to the storage bin.

The Pittsburg & Westmoreland mine is also located on the Manor branch, and is only a short distance from the Penn-Manor mine just described. This mine has been opened by a slope 660 ft. in length, which reaches the coal at about 170 ft. below the surface. The power equipment consists of two 60-h.p. boilers, one 150-h.p. Erie City boiler, one 150-h.p. Erie engine and one 150-kw. Morgan-Gardner generator. Morgan-Gardner mining machines are in use. The water in the mine is taken care of by one large Smith Vaile pump, four Blake 4x6-in. pumps, and three mine pumps of 300 gal. capacity. Ventilation is accomplished by one 10-ft. fan driven by a 60-h.p. engine, and one 6-ft. fan. This mine has been working for several years.

The Hazel Kirk mines are located on the Ellsworth branch of the Pennsylvania Railroad, which connects with the main line at Monongahela City. At the Hazel Kirk No. 1 mine, the main hoisting shaft is 78 ft. deep. The bottom of the shaft is equipped with a chain haul to return automatically the empty cars to the siding, where they are picked up by the locomotive. There are also sidings and cross-overs arranged so as to handle the coal easily, and at a minimum cost. The tipple has a Phillips' cross-over dump and a chain haul to return the cars automatically to the rear of the shaft. The cage is operated by a 20x20-in. double-cylinder first-motion hoisting engine, with a 6-ft. drum.

SCHOENBERGER TIPPLE.

PENN-MANOR SHAFT AND TIPPLE, MANOR, PA.

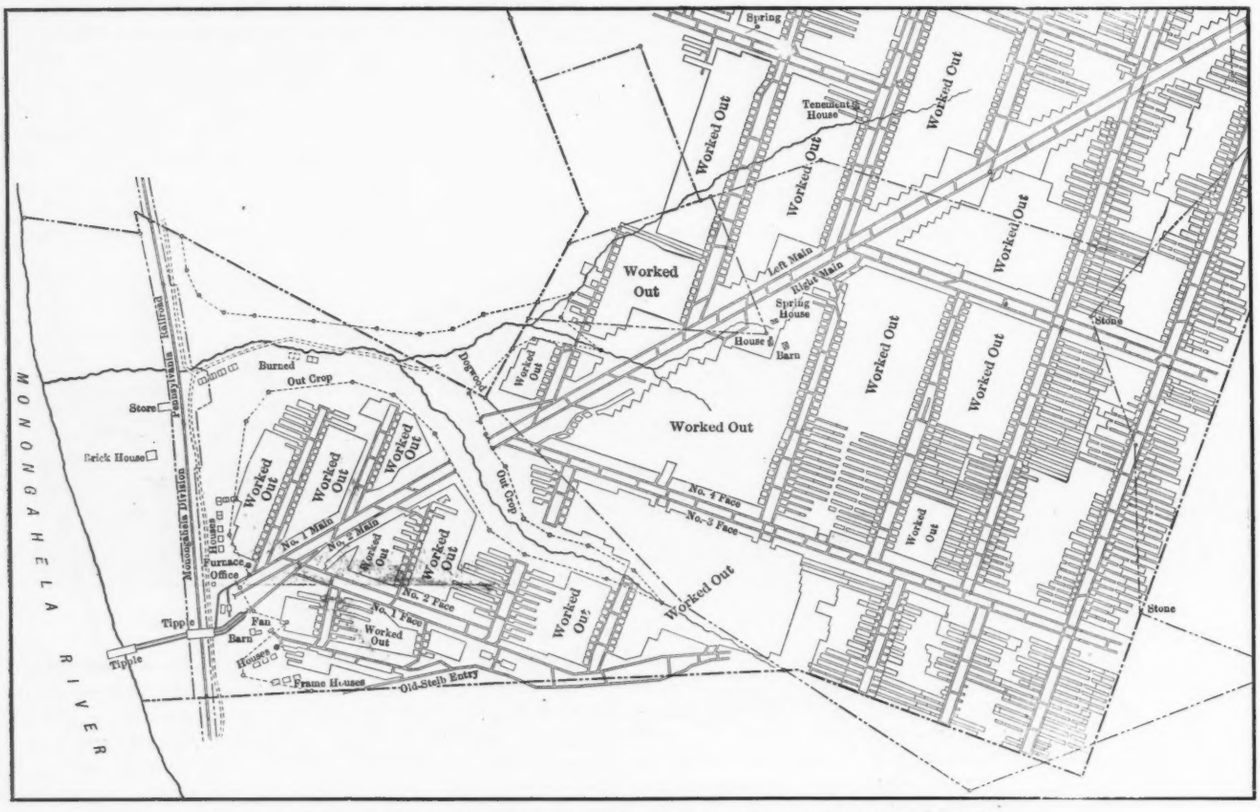
Besides the main haulage shaft, there is also an air shaft, which can be used as a manway. A 20-ft. Guibal-pattern fan, driven by a 12x24-in. engine, supplies the necessary ventilation to the mine.

The power house is constructed of tile with "granite" roofing. It contains one 500-h.p. Stillwell-Bierce heater, three 150-h.p. tubular boilers, one 17x18-in. self-oiling Skinner engine and one 100-kw. Morgan-Gardner generator, belt connected. Underground haulage is accomplished by one 10-ton Jeffrey locomotive and mules.

reached by a shaft 100 ft. deep. The bottom of the shaft is graded to return the empty cars by gravity. At the surface, the tipple has a chain haul for returning the empty cars automatically to the rear of the shaft, as at Hazel Kirk No. 1. The cage is loaded and unloaded by means of steam rams. The engine and boiler house is constructed of brick with slate roof. The power equipment consists of three 150-h.p. tubular boilers, one 50-h.p. Stillwell-Bierce heater, one 20x20 in. double-cylinder first-motion hoisting engine, one 19x

and "gondolas." There is also an Ottumwa box-car loader. The pumping equipment is in duplicate at this mine, as at shaft No. 1. The 17A Jeffrey mining machines are to be used to undercut the coal.

The general method of development and working the coal is similar in all the mines. The coal is attacked by the double-entry system. Two main parallel headings, known as right and left main headings, are driven with a pillar of 50 ft. between them. Break-throughs connecting the two main headings occur every 150 ft. This



PORTION OF THE SCHOENBERGER MINE, CARROLL, WASHINGTON COUNTY, PENN.

The Jeffrey undercutting machines, style 17A, making a 6-ft.x44-in. undercut, are used in this mine. There are two Duplex Stillwell-Bierce steam pumps, and one 4x6-in. Deming electric pump in the workings. All pumping machinery is duplicate to provide for emergencies.

At Hazel Kirk No. 2, the mine is

19-in. automatic self-oiling Skinner engine and one 150-kw. Jeffrey generator, belt connected. The air shaft is 100 ft. in depth, and serves as a manway. A 20-ft. Guibal fan, driven by a 12x24-in. engine, supplies air to the workings. The tipple has two sets of pans, screens and scales, one set to be used for loading box-cars

HAZEL KIRK NO. 2.

applies also to the crossheadings, unless they are driven from opposite directions to meet. The face headings are usually 1200 to 1300 ft. apart. Rooms are turned in both directions at right angles to the headings.

The coal is readily marketed, owing to the fact that the mines are located in the largest industrial center of the world, and in addition to local consumption, the character of the coal places it in all the markets from Boston to Duluth. The coal is low in sulphur and ash, gives a maximum quality of gas and stands transportation well. The coal is specially sought by terra-cotta works, potteries and cement plants, which require a long-flame fuel. The coal is also in demand by steel plants, gas and malleable iron works, where low sulphur content is an essential quality. The mines described in these paragraphs are recognized as being among the largest producers in their respective localities, having records that will assure a reputation for the new company which has absorbed them.

THE ENGINEERING AND MINING JOURNAL

Published Weekly at

505 PEARL STREET, NEW YORK

London Office: 20 Bucklersbury, London E. C., Eng.
CABLE ADDRESS "ENGMINJOUR, N. Y."

Subscription, payable in advance, $5.00 a year of 52 numbers, including postage in the United States, Canada, Mexico, Cuba, Porto Rico, Hawaii or the Philippines.

To Foreign Countries, including postage, $8.00 or its equivalent, 33 shillings; 33 marks; or 40 francs.

Notice to discontinue should be written to the New York office in every instance.

Advertising copy should reach New York office by Thursday, a week before date of issue.

Copies are on sale at the news-stands of the following hotels:—Waldorf-Astoria, New York; Brown Palace, Denver; and the leading hotels in the principal cities.

Copyright, 1906, by
THE ENGINEERING AND MINING JOURNAL.

Entered at New York Post Office as mail matter of the second class.

During 1905 THE ENGINEERING & MINING JOURNAL *printed and circulated* 454,250 *copies, an average of* 8735 *per issue. Of this issue* 12,000 *copies are printed. None sent regularly free. No back numbers beyond current year.*

Contents.

PAGE

Editorials:
The Metal Markets in September..... 643
Mining in Mexico..... 643
Iron Production in 1906..... 644
The Situation of Copper..... 644
The Coal Markets..... 644
*La Cananea Mining Camp. *Dwight E. Woodbridge* 623
Increased Cost of Labor and Material... 627
*The Copete District of Central Sonora. *F. J. H. Merrill* 635
Nickel Deposits of North Carolina..... 629
*The Sahuaripa District, Sonora, Mexico.....*C. Nelson Nelson* 629
Tin in Bolivia..... 631
*Automobiling in Nevada..*Claude T. Rice* 631
The Berg- und Metall-Bank..... 632
*Borax Mining in California. *Day Allen Willey* 633
Gold and Silver Movement in Mexico... 634
*The Mining Camp of Sinaloa, Mexico. *F. J. H. Merrill* 635
Improved Traveling in Mexico..... 636
Mechanical Charging for Zinc Retorts... 636
*Lignite Briquets.....*Elwyn Waller and H. Stanley Renaud* 637
*Consolidation of Five Large Coal Mines. *J. Leggett Pultz* 640
*Drifting and Stoping at Lake Superior.....*W. R. Crane* 645
New Publications..... 647
Correspondence and Discussion:
Mining in Ecuador. *Leonard L. Wetmore* 647
Electric vs. Air Drills. *Benj. B. Lawrence* 647
Mixing and Laying Bituminous Concrete and Mill Floors.....*C. H. Chadsey* 647
The Italian Sulphur Trust..... 648
Questions and Answers:
Air Consumption of Rock Drills..... 648
Abstracts of Official Reports:
Crown Reef Gold Mining Company.... 648
Personal and Obituary..... 649
Societies and Technical Schools..... 650
Industrial, Trade Catalogs, etc..... 650
Mining News..... 651
Markets..... 656
Dividends of Mining Companies..... 664
Mining Index..... 665

**Illustrated.*

The Metal Markets in September

Spelter, which has been quite steady for several months previous, experienced a noteworthy spurt in September under the heavy buying of consumers, especially one large interest, which of itself requires a large part of the domestic production. At the beginning of the month the price at New York was 6.05. It rose to 6.35c. and closed at 6.20c., the average for the month having been 6.216c. against 6.027c. in August.

The conditions during September were extremely favorable to the smelters, because of the ampleness of the supply of ore that has been offered. While the price of spelter rose during the month, the price for ore declined. At the beginning, blende of 60 per cent. grade sold at Joplin at $43.-75 per ton; at the end the price was $42. The present difference between the values of zinc in ore and in spelter affords a large margin of profit to the smelters. At the end of September there was reported to be 5000 tons of ore in stock at Joplin, the largest quantity since last spring.

The price for lead remained unchanged during the month, the quotation for desilverized at New York being 5.75c. During the month, some small lots of spot lead and special brands sold at a small premium, but the wholesale business in this metal is done at the price fixed by the American Smelting and Refining Company.

The markets for tin, antimony, nickel, quicksilver and aluminum have been without special feature.

A noteworthy development of the month was the sharp advance in the price for platinum, which during the week ending Sept. 5 rose to $33 per oz., the scarcity of the metal and the unsettled state of affairs in Russia being assigned as the causes.

Silver was strong throughout, the price rising from 66¾c. at the beginning of the month to 68½c. on Sept. 24, and closing at 68½c.; the average prices were 67.927c. in New York, and 31.483d. in London. The exports for the month were large. The main support of the market was the demand for the East. India is prosperous, and is, as usual, putting its surplus into silver; while China, which has been only a small buyer in London recently, made its appearance with considerable orders in September. The buying of 100,000 oz. weekly by the United States Mint, for subsidiary coinage, also helped the market. Still another cause is the demand for the metal in the arts. The silversmiths are busy, as they generally are in prosperous times, and their buying of silver has been on a large scale.

The iron and steel markets were in rather an excited condition for most of the month. After a period of comparative quiet, there came a sudden rush of buyers after pig iron. Apparently consumers had just realized their need of supplies, and at once began to close contracts for the last months of this year and the first half of 1907. The result was a sharp rise in prices, and the month closes with bessemer and basic pig selling at $19 and $18.75 at western Pennsylvania furnaces, while No. 2 foundry finds a market at $21 at tidewater, and Southern foundry is held at $16.50 Birmingham. In finished material there was also a rush to buy. The large companies, like the Steel Corporation and the Jones & Laughlin Company, have endeavored to prevent any considerable rise. The various pool quotations for steel products nominally show little change; but higher prices are really paid on most new orders—especially the smaller ones—under the disguise of premiums to secure deliveries. Meantime furnaces and mills are generally assured of abundant work well over the first half of next year.

Mining in Mexico

The history of Mexico as a mining country is well known. For nearly 300 years it was the great silver producer of the world; silver was its chief interest, and many of its great mines were famous everywhere. In recent years, however, extended exploration and the introduction of new methods have brought about important changes not only in the improvement of mining and metallurgical work, but in the diversification of the mining industries. While silver is still a most important product of its mines, gold mining has become a prominent feature of the industry; while copper deposits have been discovered and developed at a rate which have already made Mexico one of the chief copper producers of the world. For many years the Boleo, in Baja California, was the sole important producer of the red metal; but now the great mines of Cananea and Nacozari, with many others, are coming into prominence. There are iron resources also, and a beginning has been made in coal min-

ing; but the development of these is still in the future.

It may be said that mining in Mexico is still in a state of transition. It takes time to change the methods of a long established industry. In some districts the old methods are still adhered to, while in others the latest and most approved practice may be found. In others, the ancient and the modern may be found side by side, in contrast. The old is gradually passing away, however, and before many years modern practice will be well established everywhere.

Two articles published in our present issue well illustrate this. In that on Cananea, by Dwight E. Woodbridge, there is an account of a modern camp, where the mines are worked on approved methods, where the latest practice in ore treatment has been adopted, and the mills are equipped with machinery of the latest approved types. Railroads furnish all facilities for transporting supplies and the heaviest machinery. On the other hand, in the article on the Sahuaripa district, Mr. Nelson describes a camp where the old methods still largely prevail; where new discoveries have been made, but improvements are slow, and transportation difficult. New machinery can be brought in only by costly and difficult methods, which limit closely the weight of its parts, and make specialized construction a necessity. Such contrasts are to be found in many places in the Republic.

The future of mining is Mexico is assured. The great and diversified resources of the country are attracting capital, most of which is well invested. The best mining engineers of the world are finding employment in the country. There is every reason to believe in its continued progress and prosperity.

Iron Production in 1906

A striking feature of present industrial conditions is the great activity of the iron trade all over the civilized and commercial world, which is now almost in its third year of advance. Increases in production and consumption are reported everywhere, except in a few countries—Russia for instance—where special conditions have checked prosperity. The basis of the trade is in the production of pig iron; and in the table below will be found the output for the first half of 1906, of the three chief iron-making countries, which together furnish about 80 per cent. of the world's supply. The figures for Great Britain and our own country are in long tons, of 2240 lb.; those for Germany in metric tons, of 2204 pounds:

	1905.	1906.	Changes.
United States.....	11,163,175	12,602,901	I. 1,439,726
Germany.....	5,098,588	6,073,936	I. 975,348
Great Britian.....	4,621,600	4,905,424	I. 283,824
Total.....	20,883,363	23,582,261	I. 2,698,898

The United States shows an increase of 12.9 per cent. over the first half of 1905; while the gain in Germany was 19.1, and of Great Britain 6.1 per cent. Germany showed the largest proportional increase. The total gain was 12.9 per cent.

The Situation of Copper

As was foreshadowed by the enormous transactions in copper toward the end of August, the price for the metal rose steadily in September, but the upward movement surpassed all anticipation. At the beginning of the month the price for Lake was 18⅞c., and for electrolytic 18⅝c.; at the end the prices were 20⅛c. and 19⅝c. respectively, the averages for the month having been 19.328c. and 19.033c. against 18.706c. and 18.38c. in August. Thus the price for copper has attained a figure higher than since January, 1882, when the average price for Lake copper was 20.25 cents.

The present situation is unparalled, the producers having sold ahead not only for the remainder of this year, but also far into next year, so that at present there is comparatively little copper left available for delivery during the next four months. The cause for this position is simple, viz., a great consumptive demand and a comparatively small increase in production, conditions to which we called attention many months ago. The forcing upward of the price has been due to the eagerness of consumers to cover their requirements, an eagerness which continues unabated.

It would now be futile to attempt to forecast the near future. There is no immediate prospect of a significant increase in the rate of production. The market price will be determined by the consumers. Frantic bids for the metal may carry the price up to the point where consumers themselves will cease to buy. There must be some such point, but where it is no one can say.

The situation is one that requires calmness. When it is said that the producers are now sold out for the next four months, and further, it does not mean that there is no more copper to become available during that period. There are many unforeseen contingencies that may happen to a supply of metal between the mine and the casting machine, and few sellers of the refined metal care to enter into contracts for the last pound that they hope to make. Consequently, as time goes on, and no misfortune is experienced, they will be gradually in a position to release reserves held back for safety, and the belated consumer is likely to find available metal that he requires. The price will be determined by the extent to which consumers, fearing that they can get no copper, continue to bid it up against each other.

The Coal Markets

The strike which affected coal production in April and May has had only the effect of stimulating production since then; and it is apparent that the output of bituminous coal in 1906 will exceed that of last year. With anthracite, the accumulation of large stocks in November and December, in anticipation of trouble, has had its effect in the shipments of the current year, and it is doubtful whether they will quite reach the high figures of last year.

The dominant feature of the coal markets, both East and West, in September, was the difficulty in obtaining cars to move the coal mined. Railroad delays and blockades were of constant occurrence, and few mines were able to work to their capacity, because it was impossible to ship all the coal. In some cases, notably in Indiana and Illinois, this was not an unmixed evil, since it prevented overstocking of the markets; but in others it was a serious embarrassment to the trade and to consumers. There are complaints in some quarters of scarcity of labor, but it seems probable that the supply of coal will be sufficient.

THE ARTICLE ON the manufacture of briquets from lignite, by Messrs. Waller and Renaud, which we publish elsewhere in this issue, is both timely and valuable. The increase of fuel supply is always a highly important consideration. Mr. Renaud especially has made an extensive study of the subject on which he writes, which subject holds already an important place in the industrial work of Germany. It seems to promise also a profitable field for investigation in many sections of this country, to whose great lignite resources attention has already been called.

DRIFTING AND STOPING AT LAKE SUPERIOR

An Analytical Discussion of the Methods and Costs

BY W. R. CRANE*

The difference in practice of drifting and stoping, in various districts, is due mainly to the character of the formations and the occurrence of bedding planes, cleavage and fissures. The preference of the miner, formed largely by previous experience, influences to a certain extent the choice of methods employed by him; but ultimately the prevailing conditions become the dominant factor in determining methods.

The comparatively hard and rather solid amygdaloid formation of the Kearsarge lode, northern Michigan, makes the drilling operations somewhat difficult, although the prevailing low pitch of the lode renders the setting up of the drill easy. The mining operations, including development work, may be considered in the following order: Shaft sinking, drifting and stoping. Stoping may, for convenience be subdivided into drift, cutting out, and raise stoping. Only drifting and stoping will, however, be considered in this connection.

DRIFTING.

Levels are usually opened by drifts, especially for the first 40 to 50 ft., or until the shaft pillar is passed, after which the drift may be developed into and combined with stoping, which operation is then known as drift stoping. Further, when barren ground is encountered on levels, they are maintained by drifts, thus connecting the workable portions of the lode on the respective levels.

Drifts are usually driven 6 ft. wide and 7 ft. high, although practice varies considerably with respect to size. An arrangement of holes, employed in drifting in the Mohawk and Wolverine mines, is shown in Fig. 1. The lower portion of the face is first removed by a number of short, downward pitching holes, as shown, although an initial opening, or sump, may be formed by grouping a number of holes in one, usually the right-hand, lower corner. Having thus unbound the lower part of the face, the remaining portion is broken out, following which the upper portion is knocked down by shots, placed in holes drilled as shown in Fig. 1.

The depths of the individual holes for drifting are given in Table I, while in the last two columns are the total depth of holes for a complete round, and the time required in drilling them. The time is calculated by multiplying the total depth of holes, in feet, of a complete round, by the time required to drill 1 ft. of hole. See column 6, Table II. The time thus obtained is 13 hours, 16 minutes, which, as the length of a shift is 10 hours, gives approximately 1½ shifts.

The advance made on shooting the round of holes is not, as shown in Fig. 1, more than 4 ft., or about two-thirds of the longest hole, probably a fair estimate. The advance made per month, on the basis of 4 ft. per 1½ shifts, would be 69.2 ft. The practice is not, however, to drill a complete round of holes before charging and firing, but rather to drill a few, charge and fire, then clean up, and so on until an advance has been made. It is then evident that much time is spent other than in drilling. The usual time taken for an advance is 2½ to 3 shifts, and as only one shift is worked a day, from 2½ to 3 days are required for an advance of 4 ft. In 26 working days (one month) there would then be 10.4 advances made, which at 4 ft. to the advance gives 41.6 ft. The rates of advance for a number of months' work, in the drift in question, range from 30 to 43 ft., averaging 40 feet.

Drifting is paid for at the rate of $8 to $8.50 per linear foot. The cost of drifting itemized, is as follows: 8 boxes of powder, $136; 1 box of candles, $8; 1100 ft. fuse, $11; 3 boxes of caps, $6; 3 gall. of oil, 90c.; drill boy, $15; steel, $2; total, $178.90. An advance of 40 ft., at $8, gives $320, which, minus expenses, leaves $141.10, or $70.55 per man per month.

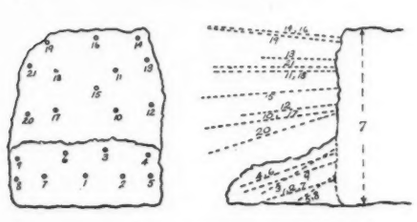


FIG. 1. ARRANGEMENT OF HOLES IN DRIFTING.

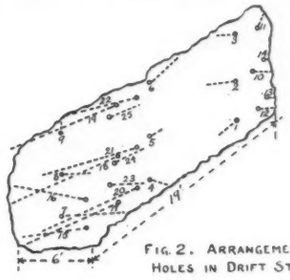


FIG. 2. ARRANGEMENT OF HOLES IN DRIFT STOPING.

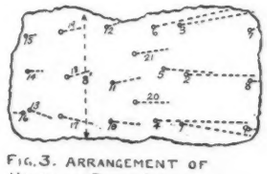
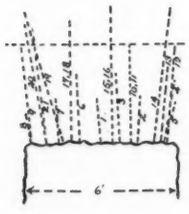
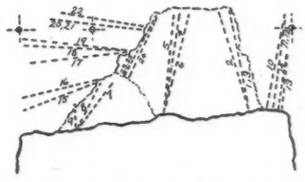
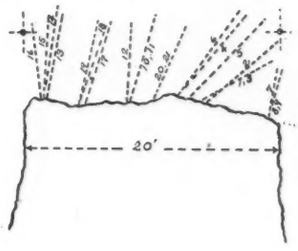


FIG. 3. ARRANGEMENT OF HOLES IN RAISE STOPING.







ARRANGEMENTS OF DRIFTING AND STOPING HOLES.

*Assistant professor of mining, School of Mines, Columbia University, New York.

TABLE I.

	Depth of Holes in Feet.																									Total Depth in Feet.	Total Time.
No. of Holes...	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	
Drifting.....	3.0	3.0	3.5	4.0	2.0	3.5	3.0	2.0	4.0	5.5	5.0	4.0	3.0	5.5	5.5	5.5	5.5	5.0	5.5	5.5	5.0						88.5	13 hr. 16 min. 1½ shifts.
Drift Stoping..	8.5	8.5	8.5	8.0	8.0	8.0	5.5	4.5	2.0	8.0	8.0	8.0	4.5	4.5	6.5	6.5	9.0	9.0	9.0	8.0	8.0	7.5	5.5	5.5	5.5		174.0	21 hr. 45 min. 2 shifts.
Raise Stoping.	6.5	8.0	6.5	8.5	9.0	8.5	4.0	4.0	4.0	6.5	6.5	6.5	7.0	8.0	7.0	6.0	7.5	7.0	7.0	6.5	6.5						141.0	18 hr. 48 min. 2 shifts.

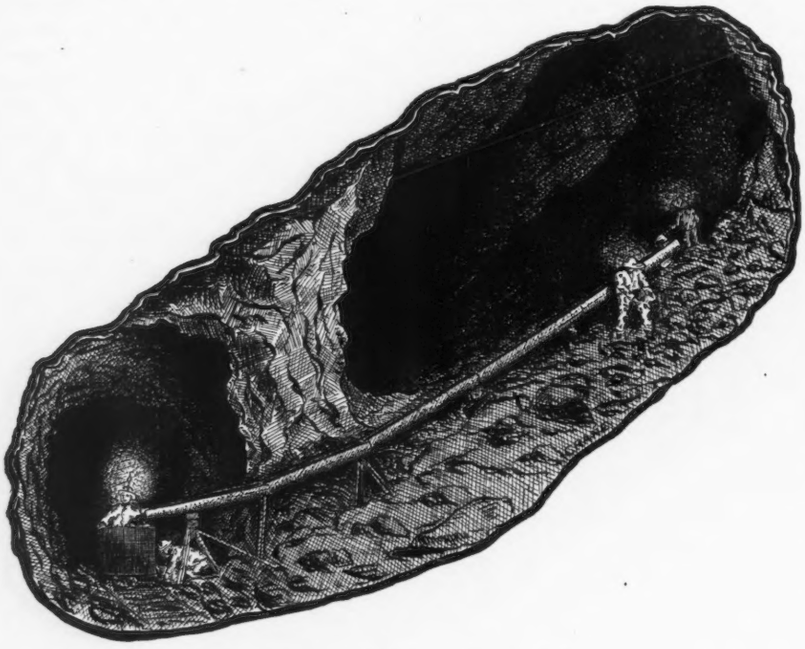
STOPING.

As outlined above, there are three forms of stoping, which will be considered in the order given.

Drift stoping is the usual method of developing and working a level, and consists in carrying a face 25 ft. wide practically the full hight of the lode—the lower part includes the drift, and is run at the required grade of the level. A common arrangement of holes for drift stoping is given in Fig. 2, although no exact rule can be given regarding the practice—conditions and character of rock govern; when possible, however, the lower or drift portion is attacked first, thus forming a sump into which the remaining upper portion is broken. Length of holes, total depth of holes and time of drilling are given in Table I.

Stoping is paid for by the fathom, the exact amount varying with the particular stope and conditions prevailing therein—$6 to $9 per fathom is common, average probably $8. A fathom is 216 cu.ft. (6x6x6). The average hight of stope is 12 ft., or 2 fathoms, the miner being paid for that hight of stope, regardless of whether the actual hight exceeds or falls below it. In drift stoping the width of drift is subtracted from the width of stope, that portion being paid for as drifting rather than stoping; $5.50 is the usual rate per foot. The miner then receives $8 a fathom for 19 ft. width of stope, 12 ft. high, and $5.50 per foot of drift, 6 ft. wide by 12 ft. high.

The amount of rock mined in the stope shown in Fig. 2 is about 4½ fathoms, steady drilling for two shifts; but owing to cleaning up and delays other than those attendant upon drilling, which have been considered, not more than one-half of this amount can be broken down regularly, and 2¼ fathoms may be considered a fair estimate. As there are two regular shifts per day, the number of fathoms per month would be 58½, which, at $8, gives $468 per month. Two drilling crews must divide this amount among themselves, each man receiving $117, from which the expenses must be deducted. A drill boy serves two crews, his wages being divided equally between them. In a similar manner the company charge of $4 for drill steel per drill per month is divided between the two crews, day and night shifts, operating the same drill.



RAISE STOPING, "BREAKING THROUGH."

Details of miners' expenses in stoping are as follows: Candles, 2 boxes, $16; powder, 7 boxes, $119; fuse, 800 ft., $8; caps, 200, $4; oil, 3 gall., 90c.; drill boy, $15; steel, $2; total, $164.90. Incident with this expense 40 fathoms of rock were broken down, which, at $8, gives, $320; deducting expenses, there remains $155.10.

The expense per fathom, average of a number of accounts, is $4.24. The cost of the 58½ fathoms is then $248, which, deducted from the amount received, $468, leaves $220 profit for the 19 ft. of stoping. The expense of driving the drift portion of the stope a distance corresponding to the advance of the stope portion (6½ ft.) at $4.44 per ft. amounts to $28.86, while there was received for that advance $35.75. The total expense and amount received for advancing the drift stope 6½ ft. are $276.86 and $503.75, leaving a profit of $226.89, which, divided among four men, gives $56.72 per man per month.

The arrangement of the holes 1, 2, 3, 4, 5 and 6, Fig. 2, is rather unusual, but was considered advisable in this case owing to the condition of the face; further, the lower projection is somewhat foreshortened, a vertical projection being taken rather than one normal to the face.

Raise stoping consists in cutting a passage the full hight of the vein and from 20 to 25 ft. wide, directly up the pitch. These passages form break-throughs, connecting stopes for man and air ways; they are usually run at the end of stopes and especially at boundaries. The faces of raise stopes are horizontal; being driven directly up the pitch of the vein, the setting up and operation of drills is, however, similar to that in other forms of stoping. For operation of raise stoping see Fig. 4. An arrangement of drill holes for raise stoping is shown in Fig. 3, while data regarding depth of holes, time of drilling and total depth of holes are given in Table I.

The arrangement of holes given is common; condition of face determines, however, whether the work shall begin at one side or in the middle—if in the middle, drilling will be carried on, on both sides; i.e., the holes will slope toward the middle from the sides, instead of sloping all one way, as when the work begins on one side. Raise stoping is paid for by the fathom, similar to the stoping part of drift stoping.

The amount broken down in the stope shown in Fig. 3 is four fathoms (5.5 ft. deep x 20 ft. long x 8 ft. high divided by 216 ft.). Delays other than those common to drilling and setting up will reduce this one half or to about two fathoms for two shifts. As there are two shifts per day and 26 days per month, 52 fathoms per month would be broken down, which at an expense of $4.24 gives $220.48 to be deducted from $416, amount

TABLE II.

	Average Depth of Hole in Feet.	Kind of Hole.	Total Time of Drilling per Hole.	Delays in Drilling.	Actual Time of Drilling per Hole.	Time Required to Drill 1 Foot of Hole.	Average Number of Sticks of Powder per Hole.
Drifting. Average of 10 Holes	5.76	Dry.	52' 23"	13' 00"	36' 44"	9' 1"	4.6
Drift Stoping. Average of 9 Holes.	5.6	Dry.	41' 47"	19' 29"	24' 4"	7' 27"	5.6
Cutting out Stoping. Average of 6 Holes.	7.5	Wet and Dry.	48' 40"	28' 10"	39' 54"	6' 29"	5.2
Raise Stoping. Average of 9 Holes.	6.5	Wet and Dry.	52' 12"	11' 12"	51' 6"	8' 1"	6.1

received, leaving $195.52 profit per month.

Cutting-out stoping, or stoping proper, consists in removing the vein content in a more or less regular way, i.e., by cutting out a portion of definite width from the face of the drift or drift stope, and parallel with it. Stoping under these conditions is most favorable to rapid work in drilling and clearing away the broken rock as the work is done on a broad face. The price paid per fathom is the same as with other stoping operations. When, however, the ground breaks readily and the stopes are large, the amount paid is reduced, even as low as $5.50, while under less favorable conditions a higher price may be paid.

There is no definite arrangement of holes for cutting-out stoping, the miner deciding in each particular case the position of the holes; no attempt is, therefore, made to give a possible arrangement. On beginning work in the mines the miner receives $60 per month for the first two months. At the end of that time his work is measured up and he is paid $8 (or the amount agreed upon) per fathom for stoping and $5.50 per linear foot of drifting (in drift stoping). Drift contracts are let at $8 to $8.50 per linear foot advance. In all contracts, the miners furnish the supplies, the company providing drills and steel.

The above data and sketches give an idea of the practice in drifting and stoping on the Kearsarge lode, and in the Wolverine mine in particular.

New Publications

"Principes Théoriques des Méthodes d' Analyse Minérale Fondées sur les Réactions Chimiques." By G. Chesneau. Pp. 243. 5½x9 in.; paper, 4 fr. 50. Paris, 1906: H. Dunod et E. Pinat.

"The Incorporation of Trade Unions." Massachusetts Bureau of Statistics of Labor, Chas. F. Pidgin, Chief. Pp. 120. 5½x9 in.; paper. Boston, 1906: Wright & Potter Printing Co., State Printers.

"Oil Fields of the Texas Louisiana Gulf Coastal Plain." U. S. Geological Survey, Bulletin No. 282. By N. M. Fenneman. Pp. 146; illustrated. 6x9 in.; paper. Washington, 1906: Government Printing Office.

"Gas Engine Design with an Introduction on Compressed Air." By E. J. Stoddard. Pp. 97; illustrated. 9x11½ in.; paper, 25c.; flexible cloth, $1. Detroit, 1906: Parker & Burton.

Contents: Graphical construction of the $P V^n = C$ curves. Graphical derivation of the principal thermodynamic equations. A new and inclusive practical table for compressed air. Diagram for obtaining, without calculation, the pressure and volume during compression, the maximum explosion pressure, and the theoretical indicator diagram. Gasolene and air mixtures. Valves and helical springs. Strength and proportion of parts. A partial theory of the sparking oil.

Correspondence and Discussion

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the columns of this JOURNAL.

Letters should be addressed to the Editor.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Mining in Ecuador.

Sir—I beg to inform you that statements in the article on "Mining in Ecuador," published Sept. 22, 1906, which were made on the authority of Alfred Cartwright, British consul at Guayaquil, are not in accordance with the facts.

During the past month a dredge has been in operation on the Uimbi river, province of Esmeraldas, Ecuador, with results that show the properties along that river to be very rich in gold and other precious metals, and with conditions very favorable to dredging operations on a large scale. LEONARD L. WETMORE.

100 Broadway, New York, Sept. 24, 1906.

Electric vs. Air Drills.

Sir—The discussion in the JOURNAL on "Electric vs. Air Drills" is of great interest to engineers and operators of mining property, especially where the mine is situated at a high altitude where the efficiency of air compressors is much less than at sea level. I have shared Mr. Chase's experience in the trial of a number of electric drills, of which the Siemens-Halske was, with its flexible shaft, a type.

The late Edward Stoiber, progressive engineer that he was, introduced this drill in his properties in Colorado, where he installed a complete plant made in Germany. He imported a German mechanic to run the drills, and gave them a very thorough try out. They were in a way a model of delicate mechanism, but failed to stand the hard usage to which they were subjected. Hard ground in quartz mining requires power, not only in the drilling of the hole, but in overcoming difficulties inherent in the rock, such as "fissured" and "vuggy" ground, which are a rule in quartz veins in precious metal mining districts.

The Temple drill, of which Mr. Barnes makes mention, is not, strictly speaking, an electric drill. There are many evidences of its merit which cannot be denied. The main difficulty with this type of drill is, as Mr. Chase points out in his letter in your issue of Sept. 22 with the rotary transformer. The installation is somewhat awkward to handle underground, especially in stopes. In large headings it will undoubtedly show at its best and in cross-cut tunnel work can be depended upon.

The model drill, however, should be self contained and capable of exerting increased power at will. The use of power by drills is intermittent. As you point out in your editorial, the average horse-power consumed in South African practice is 12.7 i.h.p. for a 3¼-in. drill. My experience is that a drill of this type will use less horse-power under favorable circumstances; but it may be called upon to furnish 20 h.p., and of course it should have this capacity back of it. Unfortunately the rock or ore to be mined is not homogeneous, and a varying h.p. seems to be required with a wide margin, as between 8 and 30 h.p. may be necessary.

In mines using electric power, the problems of transportation, hoisting and pumping have for the most part been solved; the need, therefore, of a perfected electric drill is of prime importance, and every encouragement should be given to the manufacturer and inventor looking toward the production of an electric drill which would be free from the many objections that have been developed by the use of this type of machine where it has been tested. We have as yet failed to develop an electric drill that will act as a substitute for the air drill in a majority of cases. Much progress, however, has been made.

BENJ. B. LAWRENCE.

New York, Sept. 28, 1906.

Mixing and Laying Bituminous Concrete and Mill Floors*

BY C. H. CHADSEY.†

I recently devised the simple plant, herewith described, for the purpose of laying floors of this type. Two 8-in. brick walls about 2 ft. 6 in. high, 4 ft. apart and about 26 ft. long, terminating in a smoke flue, comprised the furnace. On top of this was set at one end the tar-melting tank, about 4x6 and 2 ft. deep, then sheet-iron plates 4x8 ft. for heating sand, then half-inch iron rods made into a grid, giving an area of 4x8 ft. for heating the crushed stone. The grid was especially efficient, as the heat could come in direct contact with and circulate through the layer of stone. A small cleaning door at the ground allowed screenings to be raked out and mixed with the batch.

The success of the operation depends almost entirely upon keeping the materials piping hot from the time they leave the furnace till they are deposited in place.

A Ransome mixer, type 1906, was selected as the type best suited to this work, for the reason that heat could be readily applied to the exterior of the drum by means of a wood fire built beneath. This proved quite effective in preventing the concrete from adhering to the blades, though occasionally the attendant would use a chisel bar if the aggregate had not been properly heated before being brought to the mixer. A little "dead oil" applied

*Abstract of an article in *Engineering News*, August 2, 1906.

†Construction engineer, Northern Aluminum Company, Ltd., Shawinigan Falls, P. Q., Canada.

to the discharging scoop, as well as to the wheelbarrows, shovels and wooden stamps, effectually prevented any concrete from adhering to them.

The method for depositing was the same as for ordinary cement sidewalks or floors. Wood strips attached to stakes driven into the ground enabled the workmen to finish the concrete at the proper elevation. The mixture acquires its full strength and hardness after a few hours or as soon as it has cooled. The wearing surface in this case consisted of a layer of 2-in. planks covered by matched hardwood flooring laid diagonally. The principal feature about this was the method of fastening the 2-in. planks. Hot pitch to the depth of about ¼ in. was poured upon the concrete floor and the planks immediately pressed thereon, the last plank laid being toe-nailed to the proceeding one just enough to keep the edges even. After a few minutes the plank would adhere so firmly that its removal was very difficult. The hardwood surface was put on in the usual manner.

The special advantage of this construction lies in its solidity and durability. The decaying of ordinary floors, which requires their renewal every five or six years, is here eliminated, since no moisture can attack the floor from beneath. Its permanency should, therefore, depend upon the wearing qualities of the hardwood surface. Its solidity is such that any ordinary machinery can be set without the necessity of special foundations, thereby cheapening the cost of installation as well as allowing subsequent additions or alterations as convenience may require.

The Italian Sulphur Trust

According to a recent report by Consul B. F. Chase, of Catania, the new law, which went into effect Aug. 1, amounts to the practical confiscation of the mines for a period of 12 years and also of the sulphur in stock.

The owners of the refineries at Catania have already filed a protest against the action of the commissioner in fixing the selling price of sulphur at Catania at a higher price than at Licata or Girgenti.

The Special Junta has been formed with its principal seat at Palermo. The commissioner has issued an order establishing 19 warehouses at Porto Empedocle (near Girgenti) and five at Licata on the southern coast of the island, and two at Catania. He has fixed the fees in lire to the warehouse men for each ton of sulphur, as follows:

	Port Empedocle.	Licata.	Catania.
Deposit and custody of sulphur	1.65	1.60	1.20
Unloading cars and hauling from station to the warehouse	.85	.80	.70
Putting on ships:			
Weighing	3.00	2.60	.60
Hauling			.95
Total	5.50	5.00	3.45

The Special Junta fixed the price of raw sulphur per centner (220.46 lb.) placed at the ship, excluding special tax of subscription at the ports named, as follows:

Quality.	Girgenti.	Licata.	Catania.
	Lire.	*Lire.*	*Lire.*
2 V	9.10	9.30	....
2 B	9.05	9.25	9.65
2 C	9.00	9.20	9.50
3 V	8.75	9.10	9.35
3 V	8.60	8.75	9.15
3 B	....	....	9.10
3 B	....	....	9.05
3 B	8.45	8.60	....
3 C	8.25	8.45	8.95

The law provides for a bank with a capital of 2,000,000 lire, which may make advances to the producers of sulphur at a maximum premium of 5 per cent., with security upon the raw product or other equivalent. The owners of unworked sulphur deposits must declare whether they intend to consign their sulphur to the company or sell it to the company itself. In the second case the price will be calculated at the fixed rate of 59 lire per ton. They will receive in return company obligations bearing 3.65 per cent. net interest, exempt from all tax, and payable semiannually, the principal being redeemable within 12 years by annual drawings. The Government guarantees both interest and principal of the obligations.

The sulphur trust, as it makes sales, will deposit the proceeds in the Bank of Sicily. All its deposits will be kept by the bank as security in favor of the Government for guaranty of the loan obligations, and subordinately with security in favor of the Bank of Sicily to reimburse the shares of capital conferred by it.

The company is to be administered by a committee of 50 delegates, a council of 13 administrators, and by a director-general, the last being named by the Italian Government. The expenses of administration are limited to 1 lira per ton, and for the relief of idle workmen caused by restriction of output or by illness to 4 lire.

Questions and Answers

Air Consumption of Rock Drills.

How many cubic feet of free air is required to operate a 2½-in. drill in ordinary hard rock, using air at 80 lb. pressure? What is the average cost of compressing air to 80 lb. pressure?

Answer—One manufacturer gives the consumption of a 3¼-in. drill at 80 lb. pressure as 127 cu.ft. per minute; of a 2½ in., 86 cu.ft. per minute. The statement of manufacturers as to this particular must be taken, however, with considerable reserve, not because of wrong intention, but because in practice the air consumption of rock drills is erratic, being dependent upon a large variety of conditions, and covering a wide range.

In one set of tests, the average of thirteen 3¼-in. drills, at 80 lb. pressure was 124 cu.ft. of free air per minute. The best of the 12 showed a consumption of 91 cu.ft. In a test at the Rose Deep mines, on the Witwatersrand, with air at 70 lb. pressure, 31 drills, averaged 81 cu.ft. of free air, per minute, including all leakage. In this test, all the drills in the mine were reduced to the uniform basis of the 3¼-in. machine, the 2½-in. drill being found to require 0.445 the quantity of air required by a 3¼-in. machine.

In a general way it may be reckoned that a 3¼-in. drill requires the equivalent of 12.5 h.p. in average working, but 28 to 32 h.p. in steady working. In order to compress air to 80 lb. pressure, the power requirement varies from 0.1193 to 0.1597 brake (or delivered) horse-power.

Abstracts of Official Reports

Crown Reef Gold Mining Company.

This report covers the year ending March 31, 1906. The working profit for this yea., after a sum of £23,731 was written off on account of new plant, amounted to £300,069. To this sum there was added a balance of £69,690 carried forward from the previous year; thus making, with sundry revenues, a total profit of £373,549. From this sum, two dividends, each of 110 per cent. on the nominal capital of the company, were distributed. These absorbed £264,000.

During the year 233,505 tons of ore mined were sent to the mill. About 17 per cent. of all the ore raised was sorted out as waste; its average assay value being 1.036 dwt. of fine gold per ton.

There were 120 stamps in operation in the mill; the duty of each stamp averaged 5.85 tons each 24 hours. The average value of the ore milled was approximately 11.88 dwt. fine; the mill yield averaged 6.56 dwt., while the value of the pulp was 5.32 dwt. fine gold per ton. Milling costs averaged 3s. 7d. per ton.

The cyanide plant treated concentrate, sand and slime amounting to 270,711 tons, for an average extraction of 79 per cent. from concentrate, 73.3 per cent. from sand, 76.5 per cent. from fresh slime, and 77 per cent. from old slime. Compared with the last year's operations the latest extraction from fresh pulp shows an improvement of more than 4.6 per cent.

During the year three large tube mills were installed. In the first month they were operated they treated 7993 tons of the coarser product, leaving the battery, for a return of 3348 oz. of amalgam, containing 1110 oz. of fine gold. This was an average of 2.75 dwt. gold per ton of material treated. The cyanide residues during the month showed a reduction of 0.3 dwt. per ton; equal to 1s. 3d. per ton milled. Subsequent results show a further satisfactory improvement through the finer grinding of the sand and concentrate sent to the cyanide works. Already the tube-mills have led to an improvement of nearly 2s. per ton in gold recovery, and an extension of their application is expected to lead to even better economies.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

Allen H. Rogers, of New York, has gone to the State of Washington on professional business.

Paul J. Myler, general manager of the Westinghouse Company, was in Edmonton, Alberta, recently.

S. S. Badger has returned to Douglas, Arizona, after an absence of two months on professional business.

W. Ballantyne, of the Conqueror group at Empire, Colo., is making an examination of property in Nevada.

John A. Avirette, of Durango, Mexico, has been in New York, disposing of some mining property in Durango.

Nathan Hirsch, of New York, is in Colorado looking after interests in the northern sections of Gilpin county.

Charlton Dixon, formerly with the Pittsburg Coal Company, is now opening a coal mine in Alberta, Canada.

E. W. Williams, of Denver, has returned from a combined business and pleasure trip to England and Wales.

J. I. Hopkins, of Bald Mountain, Colo., has returned home after a visit of several months to Eastern points on business.

L. D. McCall, of Chicago, has been out in Gilpin county, Colo., looking after interests in the Jefferson-Calhoun Mining Company.

David H. Lawrance, of Breckenridge, Colo., is spending two months in Silver City, N. M., making examinations of mining property.

Sir Henry Pellatt, of Toronto, is inspecting the Crows' Nest Pass Coal Company's properties at Fernie, B. C., and neighborhood.

Fred. G. Farish recently returned to Denver, Colo., from a three months' trip into Mexico, and is now on his way to Helena, Montana.

Alexander Hamfield, late of Victoria, B. C., is now general manager of the Northland Ore Company, with office at Duluth, Minnesota.

Carl Scholz, of Chicago, president of the Rock Island Coal Company, visited the Indian Territory mines of his company the middle of this month.

Bert McFarland, of Pittsburg, Penn., has been in Gilpin county, Colo., looking after interests in the Pewabic Consolidated Mines Company.

H. Vincent Wallace has returned from Europe, arriving in New York Sept. 21. After spending a few days in the city, he left for Nogales, Arizona.

Frank J. Kantor, of Central City., Colo., interested in the Pleasant View Company, is making a business trip to Detroit, Mich., and other eastern points.

C. L. Whittle, of Boston, Mass., has just returned from the Cobalt silver mining district, Cobalt, Ontario, where he has been examining properties.

Francis A. Thomson has accepted the professorship of mining and metallurgy at the Washington State College at Pullman for the year 1906-1907.

L. R. Tatum, of Denver, manager of the Banzai Mining Company operating at Black Hawk, Colo., is making a business visit to Eastern points.

W. H. Knowles, a well known Gilpin county operator, has returned from a trip to Nevada and California to examine mines in the interests of Eastern investors.

E. J. Garvin, president of the Garvin Cyanide Extraction Company, of Portland, Oregon, has been in New York establishing an Eastern office of the company.

R. D. O. Johnson, general manager of the De Soto Mining Company, of Middleton, Arizona, was recently in New York on business connected with his company.

E. R. Fraser is in Winnipeg in the interests of the Belcher and Winnipeg copper mines in Ferry county, Wash., in which residents of that city are largely interested.

George W. Mabee, Jr., of Goldfield, Nev., has been looking after mining interests in Gilpin county, Colo., afterward leaving on a business trip to Pittsburg, and New York points.

John H. Wilson, editor of the *Native Copper Times,* Lake Linden, Mich., is visiting New York. Mr. Wilson has been identified with mining in the Lake Superior region for 35 years past.

W. H. Storms has resigned from the *Mining and Scientific Press,* with which he has long been connected, in order to accept the superintendency of the Yellow Aster mine, Randsburg, Kern county, California.

President William G. Sharp and Managing Director Albert F. Holden, of the United States Smelting, Refining and Mining Company, are on a tour of inspection to that corporation's mines and smelters. They are now in Utah.

Ebenezer Jones, of Smithfield, Ohio, has been appointed district mine inspector for the fourth mining district, composed of the mines of Belmont, Harrison and the greater portion of Jefferson counties. Mr. Jones is an old miner, well known in his district.

Edward H. Lynde, formerly in charge of the rail department of the Lackawanna Steel Company, is now connected with the firm of Robert W. Hunt & Co., of Chicago. He will have charge of that department of the business which was formerly under the direction of the late Albert W. Fiero.

W. S. Newcomb, chief engineer for the Osage Coal and Mining Company, and the Great Western Coal and Coke Company, at South McAlester, I. T., who recently suffered an attack of heart failure and has since been recuperating at Excelsior Springs, Kan., is much improved and expects to resume his duties soon.

Francis P. Havard, formerly engaged in metallurgical work in the United States and recently at Silberhütte, Anhalt, Germany, has resigned his position at the latter place in order to accept the management of the smelting works now being built for the Copiapo Mining Company, at Dulcinea, near Copiapo, Chile. Mr. Havard will proceed to Chile in October.

H. D. Easton has resigned his position as chief engineer of the Rock Island Coal Company, at Hartshorne, I. T., to accept a position in the engineering department of the Frick Coal Company, in Pennsylvania. Mr. Easton will be succeeded by Wm. A. Evans, of Chicago, until recently chief engineer and assistant superintendent of the Consolidated Indiana Coal Company.

W. C. Greene, Alfred Romer, E. C. Rice, M. M. Parker and L. H. Hole, all officers and directors of the Greene Consolidated Copper Company, were in Duluth last week, inspecting mining conditions on the Mesabi range, with especial reference to caving and steam shovel mine operations They left for the East Sept. 28. It is generally supposed that several Duluth men will become directors of the Greene company at no distant date.

Obituary

Daniel C. George, for many years a coal operator in western Pennsylvania, died at Latrobe, Penn., Sept. 17, aged 70 years. He organized the Ridgeview Coal and Coke Company, and managed it for a number of years.

John McFee, a well known mining man of Belleville., Ont., died Sept. 21, aged 63 years. He was a Scotchman by birth, but came to Canada when a young man, and for some years was successfully engaged in gold mining in North Hastings, Ontario.

Philip F. Kobbe, vice-president and treasurer of the Westinghouse Electric and Manufacturing Company, died in Stockbridge, Mass., Sept. 21, aged 64 years. He was born in New York, educated there and in Germany, and early engaged in electrical work. He had been vice-president of the Westinghouse Company for 16 years.

Abel Hyde Toll, superintendent of the Yerbabuena Mining Company, died of typhoid fever at Yerbabuena, Durango, Mexico, Sept. 13. He was born in Baldwinsville, N. Y., and educated in California, graduating from Stanford University in 1898. Before going to Mexico, he was superintendent of the Wallace Mining Company's property at Pitkin.

Colo. He was a member of the American Institute of Mining Engineers. He left a wife and an infant daughter.

Societies and Technical Schools

Concrete Association of New York—At the meeting to be held Oct. 24, Richard L. Humphrey will deliver a lecture on building construction. It will be illustrated by numerous views. Mr. Humphrey was sent to San Francisco by the Geological Survey shortly after the earthquake and fire. He was successful in obtaining from 500 to 600 views.

Industrial

Herman Nieter, sales-agent of the Hammond Iron Works, has removed his office from No. 180 Broadway to No. 29 Broadway, New York.

The National Electrical Contractors' Association has issued a circular giving the standard symbols of wiring plans, adopted at the July meeting of the organization. Copies may be obtained by application to W. H. Morton, secretary, No. 94 Genesee street, Utica, N. Y.

The Garvin Cyanide Extraction Company, of Portland, Oregon, has established an Eastern office at 56 Wall street, New York City. Installations recently contracted for by this company include a 100-ton plant for the Sunnyside Mining Company, Thunder Mountain, Idaho, and a 50-ton plant for the Minerva Mining Company, Atlanta, Idaho.

The Illinois Steel Company has contracted for 140 large producers with gas flues and Dyblie reversing valves to operate the 28 open-hearth furnaces to be erected at Gary, Ind., after tests and careful consideration. The order was placed with the Morgan Construction Company, of Worcester, Mass., which was represented by E. A. W. Jefferies, of New York. This makes the fifth order for gas producers that the Illinois Steel Company has awarded to the Morgan Company. This company has also obtained recognition of its work in Europe, where about 100 Morgan continuous gas producers have been sold during the past 12 months.

What is said to constitute the largest individual order ever placed for tube mills for the grinding of cement clinker is one recently placed by the United States Steel Corporation. This order calls for 47 tube mills, 5 ft. in diameter by 22 ft. in length. Twenty of these are to be installed in the plant of the Carnegie Steel Company at Homestead, Penn., and 27 are for an extension to the cement plant of the Illinois Steel Company, at Buffington, Ind. This entire order was awarded to the Power and Mining Machinery Company, Cudahy, Wisconsin. In addition to this order, the Power and Mining Machinery Company has also booked an order for 14 tube mills, 5 ft. by 22 ft., and a complete crushing plant, consisting of large and small crushers and rotary screens for the Sandusky Portland Cement Company, at Dixon, Illinois.

The newly designed "Simplex" concentrating table manufactured by the Colorado Iron Works Company has a strong, easily adjusted, differential motion, that imparts the proper impulse to the ore along the riffles and the stroke may be readily shortened or lengthened according to the speed at which the pulp is required to travel toward the discharge. A highly silicious ore that requires longer time to stratify needs the slower motion obtained by the shorter stroke. The table is three-decked, each deck having a riffled rubber surface, and each deck may be independently adjusted as to side slope. This enables the operator to gage and control the flow of the gangue over the riffles, making it as rapid as possible without carrying the mineral over with it. Each deck is a separate concentrator and may be adjusted to suit its own work.

The American Spiral Pipe Works have built new shops to meet the demands of their increasing business. The shops are on Fourteenth street, between 46th and 48th streets, Chicago, and are so placed that connection is made with the Western Indiana Belt and the Chicago Terminal Transfer tracks; which means, practically, with all the railroads entering the city. The plant consists of the following buildings: Main pipe mill, power house, galvanizing building, asphalt-dipping plant, office building, forge shop, machine shop and shipping room. Practically all machines are electrically driven. They are using three-phase induction motors, the current of 220 volts for which is furnished by a 250-kw. generator driven by a Corliss engine, operating at 100 r.p.m. The lighting is entirely by the mercury vapor lights. In the plant there is much special machinery. Gas is made for special welding work. The forging department is modern throughout with special machinery for turning out flanges for every class of work from the smallest up to 300 and 400 lb. Plenty of light is secured by the use of "sawtooth" construction. A large traveling crane with a runway 600 ft. long enables them to handle large billets and load pipe at small expense.

Trade Catalogs

Receipt is acknowledged of the following catalogs and circulars:

The Hug Water Wheel Company, Denver, Colo. Catalog No. 3; Pp. 48, illustrated; paper, 6x10 in., 1906.

Smith & Egge Manufacturing Company, Bridgeport, Conn. Chains; Pp. 12, illustrated folder; paper. 4x6 in., 1906.

The C. L. Hathaway Rock Crusher Company, Denver, Colo. Prospectus; Pp. 20, illustrated; paper, 10x8 in., 1906.

The Amsler Engineering Company, Pittsburg, Pa. Producer Gas for Power; Pp. 20, illustrated; paper, 5x6 in., 1906.

The Goulds Manufacturing Company, Seneca Falls, N. Y. Goulds Power Pumps; Pp. 32, illustrated; paper, 3x7 in., 1906.

Metropolitan Engineering Company, New York City. Bulletin, Vol. 2, No. 8; Pp. 8, illustrated; paper, 6x10 in., Aug., 1906.

American Locomotive Company, New York City, Atlantic Type Passenger Locomotives; Pp. 64, illustrated; paper, 10x6 in., 1906.

Atlas Engine Works, Indianapolis, Ind. Medium Speed Automatic Four-Valve Engines; Pp. 16, illustrated; paper, 8x10 in., 1906.

Stephens-Adamson Manufacturing Company, Aurora, Ill. Conveying and Transmission, Vol. 1, No. 4; Pp. 24, illustrated; paper, 6x10 in., 1906.

The Holt Manufacturing Company, Stockton, Cal. Catalog of Traction Engines, Ore Wagons, etc.; Pp. 48, illustrated; paper, 8x10 in., 1906.

Klipfel Manufacturing Company, Chicago, Ill. K & T. Steam Specialties for Heating and Power Plants; Pp. 24, illustrated; paper, 4x6 in., 1906.

Construction News

Kansas District, Colorado—It is reported that the Jenny Creek Mining Company will put up a mill on its property. C. B. Frantz, Majestic building, Denver, Colo., is manager.

Pine Creek District, Colorado—The Evergreen Gold and Copper Company is considering the question of putting in a matte smelter. J. L. Walters, Apex, Colo., is manager.

Wide Awake, Colorado—The Dirigo Mining Company is considering the question of putting up a new mill; also of building a wire-rope tramway from the mine to the mill. G. H. Elling, Black Hawk, Colo., is manager.

Central City, Colorado—New buildings and machinery are to be put in at the O.K. mine. Alfred Anderson, Central City, is superintendent.

A new plant is to be built at the Grinnell mine, to replace one destroyed by fire. A. W. Hogan, Central City, is manager.

Hartshorne, Indian Territory—The Chicago, Rock Island & Pacific Railway Company is seriously considering the erection of a briquetting plant at Haileyville, or Hartshorne, Ind. Ter., with the idea of taking slack from the mines along its line and converting it into briquets for locomotive fuel. Carl Scholtz, Chicago, is chief mining expert for the company, and will probably have charge of the matter.

Special Correspondence

San Francisco. Sept. 25.

At the last meeting of the Anti-Débris Association, the committtee appointed to investigate the complaint made to the effect that dredging operations were being conducted in such a manner as to injure the streams, reported that in the opinion of the committee it would be necessary for some of the dredges to take steps to prevent material from reaching the streams. The committee stated that this injury could be easily prevented. The association's attorneys were instructed to communicate with the owners of the dredges, stating what was necessary to be done to prevent injury, and unless such steps were taken, that an action would be instituted against them.

Representatives of the Eagle Bar and the Imperial mines appeared at the same meeting, in response to requests to explain their methods of conducting operations at the mines. They stated that all hydraulic mining operations had ceased, and hereafter they would conduct the operations by the drift process. The representatives admitted that a certain portion of the dam had given way, as the association had stated, but asserted that in the future no hydraulic mining operations would be carried on by them. They said further that the Imperial Mining Company had increased operations, but had started work on the building of an extension to the dam, at which, they stated, the companies hoped to resume, but without doing injury to the streams.

The famous Polar Star mine case, which has been pending some time, has finally been decided against William Nichols, and he has been fined $500—the limit of the law—for hydraulic mining against the provisions of the Caminetti Act, by violating an injunction. The mine itself is at Dutch Flat, in Placer county, but the fine was imposed by a judge of the Supreme Court in Sutter county. As far back as 1898 Judge Davis, then occupying the bench in Yuba county, issued an injunction against the operation of the Polar Star mine, restraining Nicols not only from working it, but also from selling, leasing or otherwise passing it over to others to be worked by the hydraulic process. But in 1904, Nichols leased the property with the option of purchase to the Mike Corcoran Company. By the agreement he was to receive 15 per cent. of the proceeds and the purchase price was placed at $50,000. Attorney Devlin argued that by the wording of the Davis injunction the leasing of the mine by Nichols was in violation of the restraining order. The California Miners' Association started to take up this case as a typical one to defend, but its attorneys advised to the contrary, probably because it was being operated under lease contrary to the wording of the Davis injunction. The mine has a finely constructed débris dam and impounding basin, but the Anti-Débris Association has made special efforts to punish Nichols, the owner, because he had made an individual fight at his own expense to frustrate their plans and maintain his rights.

In compliance with a request filed in the case of the Standard Portland Cement Company, vs. Federal Labor Union, No. 11,345, of Vallejo and others, Judge Gesford has issued an order to the strikers of Napa Junction, which will keep them from making threats of any kind against the strike-breakers at that place.

It is reported in Truckee that John Clark, who owns several mining claims in the Meadow district, Nevada county, has an offer from Schwab and associates of $60,000 for his holdings in that section. From the same source, it is also said that the same people have made an offer of $100,000 to Mrs. Bonnifield for her mines and stamp mill. She refused to accept the tender. It is also reported that the Guggenheims have options on several claims in that district. If Schwab or the Guggenheims succeed in getting any profit out of the ores of Meadow Lake district, they will do better than anybody else has, though Californians have been trying for some forty years to make a success of mining there. At one time the camp was a large and prosperous one, but it was finally deserted entirely. Within the past ten years, however, numerous parties or companies have tried their hands with uniform poor results.

Tehama county, never known as a gold-mining region, though having some unproductive chrome properties, is getting its first taste of gold mining. The Basler Mining and Development Company, operating the only gold-mining claim in the county, has levied an assessment of 1c. per share.

The New River & Quimby Creek Mining Company is in difficulties with its secretary. At a meeting in Eureka the other day he refused to show his books and called the police to eject the directors from his office. The policeman came on the telephone call, but the directors got him to carry off the books, so the secretary lost his point after all, and the matter will come before the courts. The mines are in Trinity county.

Salt Lake City. Sept. 29.

The Western Pacific Railroad is pushing west from Salt Lake and 60 miles of track have been laid. The route of the new line through eastern Nevada has not yet been definitely determined; several surveys have been made, one of them bearing to the south somewhat after leaving the Utah-Nevada State line in order to catch a line of good mining camps and to get as close as possible to Cherry Creek and Ely.

The initial shipment of blister copper from the Garfield smelter, 15 miles west of Salt Lake, has been forwarded to the Eastern refineries.

Metallurgical Director Prosser, in charge of the system of smelting plants of the United States Smelting, Refining and Mining Company, has returned from making an inspection of the new lead refinery erected this year near Chicago. The plant will go into commission in November.

The mine owners and operators of the Tintic mining district, who have maintaned a temporary organization for a number of weeks pending a discussion of railroad freight rates to the Salt Lake smelters, are taking steps to form a permanent organization. The freight matter is still unsettled.

The Utah & Michigan Mining and Milling Company has been formed to operate in Beaver county. J. K. Parsons, of Salt Lake, is secretary and treasurer.

The management of the United States Smelting, Refining and Mining Company is installing a system of bag-houses at its Bingham Junction, Utah, smelters, with the view of abating the smelter smoke nuisance. It is expected the system will be installed before time for planting next year's crops. The company has experienced a great deal of annoyance during the past few years by reason of the filing of damage suits by farmers residing in the Salt Lake valley. While this will stop metallic dust, etc., it will not prevent the sulphur fumes from escaping.

The construction department of the San Pedro, Los Angeles & Salt Lake Railroad has begun to assemble equipment preparatory to the beginning of construction of the Caliente & Pioche branch, which will be about 30 miles long, and will give transportation facilities to the old camp of Pioche. It is expected work will be started in October. The company is surveying a line from Salt Lake to Ely, Nevada.

Thompson Campbell, of Butte, Montana, and associates have completed a deal for the purchase of the Godbe-Hampton antimony mine in Garfield county, Utah, which has been idle for a number of years. Development is to be begun and facilities provided to treat the ore.

The scheme of the promoters of the Continental Mines and Smelters Corporation, owner of the Continental Alta mine at Alta, to build a railroad into that camp seems to have fallen through. Although the company has had a lease on the right of way of the Rio Grande Western Railroad for about a year, not a move toward construction has been made.

Denver. Sept. 28.

Charles A. Prouty, one of the members of the interstate commerce commission, is at present investigating alleged wholesale thefts of coal lands in this State, Wyoming and Utah, and several prominent men of Denver have been

subpoenæd as witnesses. It is generally understood that the alleged discrimination in freight rates against Denver will also be looked into, as also the relation between the Utah Fuel Company and the Denver Rio Grande railroad system.

The output of the Colorado Fuel and Iron Company in steels rails is sold for the next 18 months. That company will probably produce about 2,250,000 tons of iron and steel during the current fiscal year.

In the Federal Court, Judge Lewis denied the motion for a new trial filed by the Portland Gold Mining Company in the suit brought against it by F. Hermann, for using and manufacturing certain machinery, invented by the latter.

The Dillon mine in the Cripple Creek district, which has produced a good deal of rich ore, but which lately has not been worked extensively, has been purchased by the Granite Gold Mining Company for $162,000.

Two new corporations have just been formed and have filed their papers in the office of the Secretary of State, these being the Yankee Coal Company, principally interested in Colfax county, New Mexico, capitalized at $5,000,000 and the United States Zinc Company capitalized at $1,700,000, the latter being connected with the Guggenheim interests.

Thos. F. Walsh has spent some time in the southwestern part of the State and will probably develop some promising properties in Poughkeepsie gulch, located a short distance from the Campbird.

A certificate naming W. V. Hodges, of this city, as agent in Colorado for the Stratton's Independence Company (limited) has been filed in the office of the Secretary of State.

Duluth. Sept. 30.

Equipment orders for the Lake Superior iron-ore roads have been increased to such an extent that it is evident the roads will do a far larger ore traffic the coming year than this, large as 1906 will be. The Duluth, Missabe & Northern is to have 1750 new steel ore cars of 50 tons capacity and the Duluth & Iron Range will have 700 of the same, all to be built by the Pressed Steel Car and the Standard Car companies. They will also have about 30 new locomotives and a large number of other cars. The Duluth & Iron Range will rebuild one of its old docks, and the Duluth, Missabe & Northern will complete its No. 4 dock. The Great Northern road has not yet placed any new orders, but is still getting cars bought for last spring. If the Hill ore deal goes through, as there now seems no doubt, it will have to increase its car equipment materially. It is now building an ore-shipping dock that will consume 17,000,000 feet of timber.

As an indication of the work of the Oliver Iron Mining Company on the western Mesabi, it may be stated that the company is now preparing for the stripping of a tract of 80 acres to the average depth of 80 ft. This will be a total of more than 13,000,000 cu.yd. of overburden, the largest job ever undertaken in this country, and one that will require years for its completion. The body of ore to be opened by this stripping operation is at least double the stripping over it, and it will consume many years in mining. This operation is to be at Coleraine, where the western Mesabi headquarters of the Oliver company are. At Holman, a short distance northeast, another operation almost as large is commencing. The company is now erecting washing plants at Coleraine for concentrating its ore from this section, and these will be in shape for test very shortly.

In section 17-56-23, about six miles northeast of Coleraine, the same company is now clearing off a site for a village, from which several mines in the immediate neighborhood will be handled. At present there is no development in that vicinity aside from drill holes and test-pits, but large bodies of ore have been shown by this development, both by the Oliver company and the Great Northern road, and it is on these tracts that mining will commence. In this same vicinity the Cleveland Cliffs Iron Company has two orebodies, one on the west 160 acres of section 10, and the other on the west half of the southwest ¼ of section 15. Between these two, which lie half a mile apart and directly north and south of each other, the Oliver company has an 80, that is known to contain a considerable body of ore. On section 16 the Great Northern road has a large unopened tonnage, and on 18 and 21 the Oliver company has taken a lease on which much ore has been discovered. It is reported that much of the land mentioned is to be re-drilled the coming winter.

Scranton. Sept. 18.

Prospectors in the employ of the Reading Coal and Iron Company, at the Gilberton and Draper collieries, have struck the Lykens vein, which runs over a mile and averages about 12 ft. in thickness. Several thousand men will be employed in its development. The discovery will mean a great boom for the towns in the Mahanoy and Shenandoah valleys.

A small seam of coal has also been found near Nuangola, and operations have been commenced on the mountain at that place.

The United Mine Workers have decided to postpone the prosecutions for selling fraudulent miners' certificates until such time as the United Supreme Court has passed upon the Shaleen case.

A number of collieries were idle last week, owing to shortage of cars.

The Philadelphia & Reading Company is drilling extensively west of Tamaqua.

London. Sept. 24.

A few months ago, when writing of the Briseis tin mine, Tasmania, shares in which are largely held here, I recorded that the company had now, after many years' struggle, settled down among the ranks of dividend payers, with a prospect of keeping in such a position for years. It comes somewhat as a surprise, therefore, to find that savage onslaughts on the shares are being made by certain people in Tasmania and in this country. Rumors are being persistently circulated to the effect that the reserves of tin-bearing ground are turning out to be very much less than originally estimated. The mining engineers assert, on the contrary, that no fact has come to light which gives them any reason to alter their view of things or to depart from their original estimate of available ground made three years ago. At that time Mr. Currie estimated 2,711,000 cu.yd. of tin-bearing ground, and up to Aug. 31 last 802,000 cu.yd. had been sluiced. At present 26,000 yd. are sluiced per month, yielding 84 tons on an average. In addition to the Briseis property the company also owns a large share in No. 1 company adjoining and has recently acquired further tracts of land to the north. So far as the engineers can tell us, there is nothing wrong with Briseis, and there is no reason for the alarmist reports. On the other hand, the London market has had during the past dozen years so much experience of adverse rumors from Australia being found ultimately to be based on fact, that the nervousness now being exhibited by English shareholders can hardly be wondered at.

The report of El Oro Mining and Railway Company, Mexico. for the 12 months ended June 30, last, is of special interest to English shareholders, as it is the first yearly report issued since the enlarged mill has been at work. As will be remembered, two years ago it was decided to increase the mill from 100 to 200 stamps and to go in for tube mills. In order to provide the necessary money, dividends were suspended and the whole of the cost defrayed out of revenue. The advantage gained by the new milling practice can be seen from the fact that costs have decreased from $6.87 to $5.73 gold, while the average gross value extracted is now 84.93 per cent., as compared with 73.80. During the 12 months 234,079 tons were treated of average assay value of $11.28, of which $9.58 was recovered. Only 14 per cent. of the gold and 2 per cent. of the silver was extracted by the stamps, the remainder being obtained by cyanide. The total produce realized $2,225,000 gold, and the total costs were $1,257,000. In English money the profit of the company is given as £204,756. Out of this amount £38,000 has been spent in installing electric power throughout the plant and £135,000 has been distributed as dividends.

General Mining News

ARIZONA.

COCHISE COUNTY.

Paradise Development Company—This company has started work on a crosscut, having arranged to do some extensive development work since striking black copper sulphides at the 240-ft. level. The company is arranging for a complete hoisting and pumping plant.

Savage Gold & Copper Company—This company is continuing development work with about 30 men and will at once install a hoisting plant to sink a working shaft.

Chiricahua—This company has just bonded its property to California people, who will begin extensive development work. This property has been worked in a small way for a number of years, and about a year ago was bought by W. H. Pratt who has just given the bond above mentioned.

Bernoudy—This property has been incorporated under the name of the Bernoudy Mining and Milling Company. The officers are as follows: Wm. P. Wright, president; Fred G. Bernoudy, vice-president; Geo. A. Walker, secretary; Henry C. Chamberlain, treasurer. Office at Paradise, Arizona.

Epley—This property, near Portal, has recently been sold to the Virtue Mining and Development Company with headquarters at Portal. The company has started a crosscut from the bottom of an old shaft, which is 60 ft. deep, and after proving that the ore carries and is not a surface deposit, it will then sink a permanent shaft.

Copper Queen Consolidated—It is expected that this company will make an output in 1906 amounting to 10,000,000 lb. of copper at a cost of about 7c. per lb. This company is one of the largest dividend payers in America, but it is a close corporation, and its dividends are not published. The capital stock is $2,000,000, divided into shares of $1 each, the whole being owned by eight persons connected with the firm of Phelps, Dodge & Company.

ARKANSAS.

GARLAND COUNTY.

Garland County Mining Company—This company has been organized to develop mining property in this county. W. M. Cecil is president; L. B. Roberts, secretary; J. W. Westmoreland, treasurer. The office is at Hot Springs.

MARION COUNTY.

Reynolds Mining Company—This company has been organized to open a zinc property near Yellville. C. H. Rudolph is president; D. C. Gallohan, secretary.

CALIFORNIA.

BUTTE COUNTY.

Golden Nugget—This mine, four miles from Pentz, owned by Hendrix Bros. & Reames, is yielding fine nuggets, one worth $417 being taken out recently. The company has still over a mile of channel to work in its own ground.

CALAVERAS COUNTY.

South Bank—This mine, on Indian creek, after being idle for some time is about to resume operations. There is a mill on the ground, supplied with electric power from Murphys.

FRESNO COUNTY.

Bonanza Quicksilver Mining Company—This company is preparing to begin active work on its quicksilver mines 20 miles from Coalinga.

Providence—They are working a 6-ft. ledge in this mine, 12 miles from Ockenden, and are running a tunnel 400 ft. below the old one.

KERN COUNTY.

Rosamond District—Melske & Overshiner have bought the Ella claim adjoining their property from Miss Ella Kenton for $10,000 and have expended some thousands in development work. Lida, the mine owned by E. M. Hamilton, continues to be the leading producer of the district. Melrose & McIntyre have sold part of the Lida and the Alleghany claims to J. M. Overshiner, of Chicago. A new and larger mill is to go up on the Fairview. The Big Three Company has a force of men at work on claims from which $15,000 worth of ore has been shipped.

MODOC COUNTY.

North Star Mining Company—This company has recently been formed by Baker, Maupin and others to work this claim in Hoag district.

NEVADA COUNTY.

Yuba—This old quartz mine at Maybert is being reopened under supervision of C. A. Mariner, who has 40 men at work.

Mammoth—This property, near Sweetland, is to be worked through an open cut with a steam shovel.

Eclipse—Bruce and others of Tonopah, Nevada, have joined with the Simmons Bros. to sink an incline to a depth of 700 ft. on this mine on Gold Flat (Nevada City P. O.). W. B. Simmons is superintendent.

Cold Spring Quartz and Channel Mining Company—Arrangements have been made for a new 10-stamp mill on the property near Nevada City. The 900-ft. tunnel encountered the gold-bearing channel recently, and is being driven across it, under superintendence of H. B. Gray. The gravel is cemented and must be crushed.

RIVERSIDE COUNTY.

Manganese—This mineral has been discovered on lands owned by the Southern Pacific Company near Hemet.

SAN BERNARDINO COUNTY.

McClure's—Several companies have been organized to develop claims in this district. A good wagon road has been built from Needles and a stage makes regular trips. A well has been sunk midway between the two places to furnish water for the trip.

Gwyn—In this claim in Vontrigger district north of Goffs, Messrs. H. M. Bower and W. C. Fellows have struck high-grade copper ore.

SHASTA COUNTY.

Bully Choop Mining Company—A strike has been made in the properties of this company near the Shasta county line, in the No. 2 tunnel at the end of a 40-ft. crosscut. About 150 men are employed, and 30 stamps are to be added to the 10-stamp mill. A new duplex compressor has been added to the plant as well as an aërial tramway 3000 ft. long.

SIERRA COUNTY.

Empire—This mine at Gold Valley has been developed to a depth of 600 ft., and has a 25-stamp mill, chlorination plant, etc.

TRINITY COUNTY.

Bonanza King—At this mine, Trinity Center, Jos Porter, superintendent, preparations are being made to add 20 stamps to the present 40-stamp mill, the machinery having already been ordered.

West Point—This mine, Deadwood, idle two years past, is to be started up again by the administrator of the estate of B. F. Boles.

TULARE COUNTY.

Powell—It is understood that Chas. Newman, of San Francisco, has purchased this copper mine from Barrett & De Gras, who held the option upon it.

COLORADO.

LAKE COUNTY—LEADVILLE.

Jenny June—Work is at a standstill on this property on account of the installation of new machinery, but the owners are only waiting till the surface improvements are finished to attack the body of ore now in sight.

Salida—New machinery has been installed in the Virginius and Abe Lincoln leases near Salida, and a 10-in. vein of gold ore has been opened up in the former. The extent of the strike has not been ascertained.

Crescentia—The ore channel is widening on the latest strike at the Crescentia, and the values are continually on the increase. Although the work has been progressing rapidly, the end of the ore-shoot has not yet been reached and the extent of the strike is not known. About one carload per day is being shipped.

Tucson—The orebody which was struck at the 850-ft. level in the Tucson is de-

veloping good values, and the company is now drifting along the sides of the vein. The present output is about 150 tons per day. The ore runs high in copper, lead and iron.

OURAY COUNTY.

San Pedro Gold Mining Company—This company sends us the following despatch from its mine manager: "The main crosscut tunnel is now in 2478 ft.; additional surface improvements are being fast completed. Concentrates from 104,430 lb. of ore taken from West vein No. 4 have been shipped. The Revenue-Virginius mill is now milling an additional 250,000 lb. of ore from other San Pedro veins." These shipments are for the preliminary mill test, which the company is making in preparation for the erection of its own mill and a short tramway.

SUMMIT COUNTY.

Lucky—An important strike has been made on the Lucky mine on Mineral Point, the property of the Beaver Creek Mining and Milling Company. The ore is of high grade in lead, and carries good gold and silver values, and can be shipped as it is mined. The property is also producing large quantities of mill dirt, which is being treated by its own concentration plant. Mr. Dunlap is general manager.

Gold Run—Col. C. L. Lightburn, of Denver, is making arrangements for resumption of work on this property.

Country Boy—This property, on Nigger Hill, is preparing a shipment of 500 tons of zinc ore for Iola, Kansas.

Excelsior—This mine, at Frisco, will soon be working a full force of men once more, taking out shipping ore. The ore is of good grade. Besides the shipping streaks the ledges carry large quantities of mill ore which can be treated by the company's own plant, where good concentration and separation are effected. Work of excavating is now being done for the installation of a compressor plant.

Square Deal—This property, in North Ten Mile cañon, is making progress. The camp buildings are now completed. The main tunnel is now in over 200 ft., and is being pushed toward the center of Chief mountain. The veins on the surface have a fine showing. W. W. Wonser, treasurer of the company, is now at the mine with a party of eastern visitors.

Hope—Jack Norman, an old timer of Frisco, has struck some rich ore in his property which adjoins the Square Deal.

Summit Mining Company—This company is now operating the east shaft of the Robinson, which is down 300 ft., and is to be extended 225 ft. lower, to the second contact. The property is well equipped with a plant of hoisting machinery, and a battery of three boilers and pumps. Frank Bulkley is manager.

Pennsylvania—Mr. Lewald, who is general manager of the company, states that he will install a large electric power plant on the Snake river next spring, and double the capacity of the mill.

Hoosier Creek—Manager E. E. Loring is making arrangements for unwatering the shaft. If the vein continues to dip at its present angle, the shaft should pass through it at 300 ft. The shaft is now down 100 ft., and is equipped with a good hoisting plant.

ILLINOIS.

FRANKLIN COUNTY.

Zeigler—The coal mine at Zeigler, owned by Joseph Leiter, is on fire, and all operations have been suspended. It is said that heaps of slack inside the mine were ignited, probably by spontaneous combustion. It may be necessary to flood the workings. The mine is large and well equipped, and is noted for the long and bitter fight between its owner and the miners' union.

INDIAN TERRITORY.

CHOCTAW NATION.

Missouri, Kansas & Texas Railway—This company is still pumping the coal mines at Coalgate and Lehigh, which were flooded by the recent high waters in the Southwest, and hopes to have one of the mines in operation again in a few weeks.

IOWA.

The State board of mine inspectors reports that the production of coal in Iowa for the year ending June 30, 1906, was 7,017,485 short tons. This compares with 6,806,011 tons in the preceding year, showing an increase of 211,474 tons, or 3.1 per cent. The number of employees for the year was: Miners, 11,615; other inside men, 3629; outside men, 1581; total, 16,825. This shows an average output of 417 tons per employee, or 604 tons per miner.

The casualties reported for the year were as follows:

	Number.	Per 1000.
Deaths	37	2.20
Serious injuries	116	6.89
Total	153	9.09

The inspectors state that none of the accidents was due to defects in safety appliances.

MASSACHUSETTS.

FRANKLIN COUNTY.

Charlemont Copper Company—This company, which is operating a property in Charlemont, near the mines at the Davis Sulphur Ore Company, has bought the mineral rights on a tract of land in Athol, which is said to contain merchantable mica. Mining for mica will be begun at once.

MICHIGAN.

HOUGHTON COUNTY—COPPER.

Atlantic—The sinking of the shaft on Atlantic's section 16 continues and the company expects to reach the ledge about the middle of October. A crib is being run down in advance of the three-compartment shaft and the space between the two will be filled with concrete and rock filling and rendered impervious to water. In all probability the shaft will turn with the lode, when this is reached, and follow down along the foot instead of sinking through the lode itself, as is usual in this district. It will not be surprising if, in the future, sinking in the footwall will be adopted in the copper district, on account of the many accidents to shafts which have occurred. The shaft on section 16 will probably be about 9x18 ft. and the crib-work is being built in an area of about 26x28 ft. This will leave an ample space for filling around the concrete, and minimize the possibility of caving or crushing which has been experienced on the old Atlantic property. If values prove satisfactory, electric methods will be introduced in the drifts and the mine will be opened and developed in the most up-to-date manner.

Michigan—This property shows very good values at depth. Mass copper continues abundant and the company is contemplating many improvements. Electric equipment will be installed throughout the new mill, now building, and all pumps and every moving part will be operated electrically except the head, which will be steam-driven as usual. The mill is situated on Keweenaw bay, about 40 miles from the mine, and rock will be carried by the Mineral Range Railroad.

Centennial—The new 60-drill compressor for the Centennial is expected at the mine within a few days. The foundations and housings for the compressor are all in place and it should be in service in about two months. When the installation is completed there will be a material increase in the shipments of rock to the mill.

Oneco—After five years of idleness, operations have been resumed at the Oneco property, which lies just east of the Caldwell and the Tecumseh. Captain Joseph Hocking, who was formerly superintendent during the activity of 1899-1901, remains in charge, and the present development is under way on the unnamed lode discovered about 150 ft. east of the county road at the Oneco location five years ago. The discovery at that time was the result of careful calculation. The presence of the lode was known to early explorers who had sunk pits upon it on adjoining properties, and by locating these old pits and projecting a line through them and across the Oneco, the approximate strike was determined. One vertical shaft was then started, and after sinking through 10 ft. of overburden and 30 ft. of rock, the lode was entered through the hanging wall. About 20 ft. of drifting was done upon it, and its width was determined at about 10 ft., while the dip was found to be about 40 deg. A shaft is now to be sunk, and at a depth of 100 ft. it is planned that

drifting shall be undertaken. The former exploration exposed an encourgaing amount of copper. The plant consists of a boiler and compressor, and a pipe line will be laid to furnish air for drilling and to operate a small hoist.

MONTANA.

BUTTE DISTRICT.

It is estimated that the output of copper for the Butte district during the year 1906 will aggregate about 328,700,000 lb. This estimate is based upon the production of the Washoe plant for the first six months, which was 94,360,915 lb., or at the rate of 188,721,830 lb. for the year. To this must be added about 90,000,000 lb. for Boston & Montana, 32,000,000 for Red Metal and 18,000,000 for the Clark interests. From the Washoe production must be deducted all copper produced by North Butte, La France, Pittsburg & Montana and various smaller companies and individual operators, the ore of which was treated in the plant, in order to arrive at the total output of Amalgamated. The copper production of the Washoe will be larger during the last six months of the year than the first six, on account of the fact that during the first half all ores taken from the mines of Red Metal were treated in the old Heinze plant, but have been going to the Washoe since July 1. Figures sent out of Butte for August place the copper output of the district for that month at 34,057,034 lb. and the tonnage at 14,171 per day. This is at the rate of 408,684,468 lb. of copper for the year, about 80,000,000 more than it should be, and is an excess of 1705 tons of ore a day, the output of the latter being 12,466 tons. With a total output of 328,000,000 lb., Amalgamated will likely have 228,000,000 lb. to its credit, North Butte 40,000,000, Red Metal 32,000,000, Clark 18,00,000 and La France Copper, Pittsburg and the smaller companies and individual operators 10,000,000 combined. Only La France and the Pittsburg companies outside of the principal corporations are mining much ore, the output of the former averaging 200 tons a day and the latter 140 tons. All others combined are not at present averaging 250 tons a day. Three of the good producers of the system are idle, they being the Mountain Consolidated, Minnie Healey and West Colusa, which will reduce production considerably this month. The West Colusa has a daily output of about 1100 tons when in operation; the Minnie Healey 500 and the Mountain Consolidated 500. About 300 tons a day is coming from the Colusa by way of the St. Lawrence shaft. It is expected that the Mountain Consolidated and Minnie Healey will be in operation in October.

NEVADA.

NYE COUNTY—TONOPAH.

West Tonopah—The shaft has reached a depth of 820 ft., and in order to run the north and south crosscuts at that depth as rapidy as possible, the manager has arrange to work three shifts.

Belmont—The second quarterly dividend of 10c. per share has been declared by the company. The mine workings are looking well. During the past nine months large bodies of high-grade ore have been blocked out ready for shipment. The company expects its mill at Miller's siding, 14 miles west of Tonopah, will be ready for crushing ore early next February. It will have 60 stamps, and will treat the company's own ore exclusively.

California—Work is confined to the south crosscut from the 400-ft. station, which is now over 200 ft. in length. The formation is unchanged.

Ore Shipments—The ore shipments over the Tonopah railroad for the week ending Sept. 13, as reported by the Western Ore Purchasing Company, aggregated 5005 tons, divided as follows: From Tonopah—Tonopah Company, 1802 tons; Tonopah Extension, 455 tons; Belmont, 451 tons; Midway, 102 tons; Montana-Tonopah, 175 tons. From Goldfield—2020 tons.

NYE COUNTY—MANHATTAN.

As-You-Like-It—During the week ore was cut in the Lizzard Fraction and St. George claims. The vein will be developed as rapidly as possible.

Butler—Two tunnels, each of which is to be 250 ft. in length, are being driven in this property. Several veins have been cut. The most promising is 7 ft. in with, and assays up to $40 per ton. A reservoir is being constructed to supply water to a mill the owners will shortly erect.

Cowboy—Ore has been cut in the prospecting trenches. Assays have run as high as $50 per ton. The vein matter is a bluish quartz which resembles that in the Little Grey mine.

Manhattan Giant—A gasolene hoist will be erected to enable the shaft to be sunk to a depth of 200 ft. At that depth a drift will be run to cut the vein outcropping on the surface. The vein where cut in the drift from the present bottom of the shaft is 4 ft. wide.

NYE COUNTY—BULLFROG.

Gibraltar—No. 3 ledge, a new working in No. 1 tunnel, is yielding specimen ore showing free gold.

Skookum—The ore-shoot has again been cut from the 60-ft level. Some of the ore is very rich.

National Bank—Assays from the new strike in the drift from the 100-ft. level run high. The vein is from 10 to 15 ft. in width. The shaft is 270 ft. in depth, and a drift will be started to cut the vein at a greater depth.

PENNSYLVANIA.

ANTHRACITE COAL.

Philadelphia & Reading Coal and Iron Company—This company's statement for August and the two months of the fiscal year from July 1 to August 31 is as follows:

	August.	Two Mos
Earnings	$2 237,091	$4,388.218
Expenses	2,126,859	4 258,297
Net earnings	$110,232	$129,921

For the two months, as compared with last year there was an increase of $263,859 in earnings; an increase of $232,423 in expenses, and a gain of $31,436 in net earnings.

UTAH.

BEAVER COUNTY.

Lulu—This company has opened an extension of the Horn Silver vein on the south.

Imperial Copper—This company had three carloads of ore of fair grade in the market this week.

Cedar—This company, of which Herman Barnett, of Salt Lake, is manager, is building some ore bins at the mine and has begun shipping.

JUAB COUNTY.

Tintic Ore Shipments—This week's output of ore amounted to more than 4000 tons, or 108 carloads, the shippers and amount being: Ajax, 2; Bullion Beck, 7; Beck Tunnel, 6; Carisa, 9; Centennial Eureka, 25; Dragon Iron, 11; Eureka Hill, 4; Godiva, 2; Gemini, 5; Grand Central, 6; Mammoth, 15; Star Consolidated, 1; Scranton, 3; Swansea, 2; South Swansea, 1; Uncle Sam, 2; Victoria, 6; Yankee Consolidated, 1 carload.

Lower Mammoth—Developments on the lower level of this property continue most encouraging. A body of sulphide ore with lead values predominating has been encountered. A special meeting of shareholders has been called for Oct. 24 to consider the increase of capital stock from 150,000 to 300,000 shares.

Little Chief—The management has decided to sink the shaft deeper and will install a new hoisting plant.

TOOELE COUNTY.

New Stockton—Copper ore has been found in this property. On the 1000-ft. level west from the shaft the Catherine vein was opened exposing a body of lead ore containing much shipping ore.

Southport—This company has concluded arrangements with the Honerine Mining Company for power and has begun development.

WISCONSIN.

ZINC DISTRICT.

Economy—A Galena type self-contained power head is being installed at the Economy shaft.

Ross Brothers—About five carloads of high-grade cobbed ore are piled up at the Ross mine, Linden camp.

Blewett Lease—Mr. Allen, consulting engineer for Chicago and New York cap-

italists, has been examining property in the Dodgeville district, and it is stated that a favorable report was made on the Blewett Lease, and that the deal will be closed shortly.

Foreign Mining News

CANADA.

The total payments made by the Dominion Government in bounties on iron, steel and finished steel products during the fiscal year ending June 30, 1906, were $2,400,773. The heaviest earner of bounty was the Dominion Iron and Steel Company, which was paid in the fiscal year on iron, steel, and articles made from steel the sum of $957,337. The Algoma Steel Company came next, with $535,190; Hamilton Steel, $200,692; and Nova Scotia Steel, $187,693.

The bounties paid for lead produced amounted to $90,197. There was also $291,157 paid on petroleum.

MEXICO.

CHIHUAHUA.

Chihuahua Mining Company—At the annual meeting in Houston, Texas, Sept. 19, the following officers were elected: President, John H. Kirby; vice-president, D. Borchard; treasurer, F. A. Reichardt; secretary, E. J. Eyres. J. W. Flanagan is general manager. The company owns property in El Oro district, Chihuahua.

GUERRERO.

Cia Metalurgia de Julientla—This company has recently placed an order for a smelting plant, which will contain several new and interesting features. The plant is for the mines in the mountains at Naranjo, Guerrero, and every piece of machinery is required to be sectionalized for mule-back transportation, so that no single piece shall weigh more than 300 lb. The ores to be treated carry silver-lead values, and the plant will produce silver-lead bullion for shipment. Victor M. Braschi & Co., of the City of Mexico, will deliver the plant complete, with engine and boiler, and every detail requisite for its installation and operation; the complete plans for it having been prepared and forwarded by the Traylor Engineering Company, of New York, the manufacturers.

Mitchell Mining Company—A circular from this company says that the 500-ft. level has been reached, and that they are cutting out the station and crosscutting to the ore. The converter plant was started Aug. 10, and assay reports show it is making bullion about 99 per cent. fine, carrying enough gold and silver to pay freight and refming charges. On account of the heavy rains, the heaviest known in 50 years, there has been some interruption in the running of the converter, but it made about 115 tons of copper bullion in a run of 9½ days. It is still producing bullion, and everything is running nicely. The additional converter stands and extra shells have been shipped by the Union Works. There is on hand from $500,000 to $600,000 worth of copper matte and bullion and ores at the smelter. A report from the railroad department shows that the new survey, just completed, is about 24 miles shorter than the old one. The Mexican Government has seen fit to extend the time of the concession for the construction of the first 40 kilometers of railroad to nine months from date, and has also given an extension of time to December for commencement of construction of the wharf at Port Marques. As soon as the rainy season is over work will be resumed on the railroad. Arrangements are being made with some metal people for advances on the bullion as shipped to the coast. The 350-ton additional furnace will be ready for installation by the time the railroad is finished.

SOUTH AMERICA.

BRITISH GUIANA.

Exports of gold for the eight months ending Aug. 31 were 54,200 oz. bullion, a decrease of 5808 oz. as compared with last year. This bullion was equal to 46,664 oz. fine gold, or $964,560. Exports of diamonds for the eight months were 1187 carats, valued at $7185 in all.

Coal Trade Review

NEW YORK, Oct. 3.

The coal markets in the West depend chiefly on the car supply. No improvement in transportation is reported, and complaints are heard on all sides. The Lake trade is fast approaching the rush conditions of the close of the season, and a large quantity of coal must be shipped to close up contracts this month.

In the East both anthracite and bituminous markets are quiet and uneventful. There is nothing new to report.

COAL TRAFFIC NOTES.

Shipments of coal and coke originating on the Pennsylvania Railroad Company's lines east of Pittsburg for the year to Sept. 22 were as follows, in short tons:

	1905.	1906.	Changes.
Anthracite	3,315,720	3,131,356	D. 184,364
Bituminous	21,056,370	22,871,020	I. 1,814,650
Coke	7,932,991	9,101,089	I. 1,168,098
Total	32,305,081	35,103,465	I 2,798,384

The total increase for the year was 8.2 per cent., notwithstanding the falling off in anthracite.

New York. Oct. 3.

ANTHRACITE.

There is but little improvement in the hard-coal market, and most of this is to be seen in the line trade; seaboard trade is no stronger than it has been. In some quarters a short boom in the prepared sizes has been noticeable within the week, while in others the principal business is being done in small sizes. From now until winter all fluctuations will follow the weather.

Prices remain at $4.75 for broken and $5 for egg, stove and chestnut; for steam sizes, $2.80@3 for pea; $2.25@2.50 for buckwheat; $1.45@1.50 for rice; $1.30@1.35 for barley; all f.o.b. New York harbor shipping points.

BITUMINOUS.

Some slight improvement is visible in the Atlantic seaboard soft-coal trade. Shipments of gas coal to the West are heavy, and this removes that class of coal from being a burden on the seaboard trade. The principal shipments are upon contracts, and current business is dull. It is with great difficulty that coal on the market, particularly of the poorer grades, can be disposed of. Prices remain unchanged at $2.50@2.70 for good steam coal, and $2.25@2.30 for gas coal, f.o.b. New York harbor shipping points.

The far East is improving slightly, and most of the shoal-water ports have cleaned up their orders, while other consumers are disposed to take advantage of the low freight rates prevailing. Trade along the Sound is quiet, and same is true of New York harbor; nobody sends much coal to market, but the little that arrives is disposed of with fair rapidity. All-rail trade is dull, and fair grades of coal can be bought for $1 per ton at the mines.

Car supply is short, the Baltimore & Ohio being the worst offender. Transportation shows some little irregularity. Vessels in the coastwise market vary in number. Current rates from Philadelphia are: To Boston, Salem and Portland, 65@70c.; Lynn, 80c.; Newburyport, 85c.; to the Sound, 55 cents.

Birmingham. Oct. 1.

Wind and rain storms delayed traffic during the past week and halted for the time being the steady production at the mines. The transportation facilities are somewhat improved now, the railroad officials having gotten down to hard work in providing cars. There is still a call for labor at the coal mines and with the new openings well in hand it is estimated that at least 300 men could find immediate employment.

The coke production shows no improvement. The demand is yet urgent. The furnaces not using their coke, or companies having surplus coke, are overcome with business.

Chicago capitalists have purchased coal lands in Jackson county, Ala., and it is stated will in the near future begin an active development of same.

Chicago. Oct. 1.

The wholesale coal market continues dull, in general, though in spots activity is manifest. Agents of smokeless coals, Hocking, Youghiogheny and other eastern products say they cannot supply the demand because of lack of cars. Western coals, with hardly an exception, are over-abundant for the good of the trade, notwithstanding the scarcity of cars. The anthracite business is improving slowly.

though the cool wave of last Saturday has already resulted in a number of orders.

Fine coals continue to be plentiful, and many consignments have to be sold to escape demurrage, at practically freight charges. Some carloads of screenings from Illinois mines have sold as low as 75c. and few now bring over $1 in a strictly open market. Run-of-mine from western mines also is abundant, and is quoted at $1.50@1.90. Lump and egg are coming more and more into demand and bring $1.80@2.25. The demand for Illinois and Indiana coals is much better outside Chicago than within the city and bids fair to continue good. Western and northwestern territory is taking a fair amount of coal at stable though low prices.

Quotations on eastern coals continue unchanged—$3.40 for run-of-mine smokeless—Pocahontas and New River—and $4.05 for lump and egg; $2.95 for Hocking run-of-mine and $3.30 for lump, and $3.30 for Youghiogheny (three-quarter). The last-named coal is scarce and its price unstable, the demand being large, with difficulty of obtaining supplies owing to car scarcity. Hocking coal is also very scarce, on account of transportation troubles and diversion of coal from Chicago.

Cleveland. Oct. 2.

The coal trade in this territory is still governed very largely by the car situation, which is growing daily more acute. The principal difficulty in this immediate territory is a lack of proper distribution, brought about by conflicting demands. The ore movements away from the lakes take hopper cars where they are not needed in the coal trade, depriving other sections of the desired equipment. This has stiffened the price of coal on the local market. The best grades of mine-run steam coal are selling at $1.05@1.10 at the mines, while slack is selling at 65c. at the mines.

In certain sections of the Northwest the statement is made there is a short supply on hand for the winter trade. It is hardly possible that the lake movement will not be sufficient for all needs, as the indications are the total shipment will exceed 12,000,000 tons. The movement during the summer has supplied certain sections, leaving the fall movement to take care of those districts now complaining of a shortage. Lake rates are steady on the basis of 55c. to Lake Michigan and 45c. to Lake Superior.

Coke is exceptionally strong, especially as to furnace quality. In that trade heavy buying is being done for first-half delivery, with some good orders running through the year. Furnace coke is quoted at $3 at the oven for contracts while the best grades of 72-hour foundry are selling at $3.75 at the oven.

Columbus, Ohio. Sept. 29.

At a recent conference held here between the State Railroad Commission and representatives of the Ohio Coal Traffic Association, it was agreed that the differences in coal rates, heretofore made between competitive and non-competitive points, shall be abolished. This will involve a general adjustment; and on account of the labor involved, the new rates will not go into effect until Jan. 1, 1907. It was also agreed that the tariffs to be made shall be issued by the several companies, and not, as heretofore, by the Ohio Coal Traffic Association.

Hartshorne, Ind. Ter. Sept. 29.

The Reference Board created by the last joint agreement between the Southwestern Interstate Coal Operators' Association and the United Mine Workers of America in districts 14, 25 and 21, including Kansas, Missouri, Arkansas and the Indian Territory, met in Kansas City, Mo., Sept. 14 and was in continuous session the balance of that and all of the following week. The purpose of the board is to settle all disputes arising under the agreement and not otherwise settled, with the provision that all disputes on which it cannot agree shall be referred to an arbitrator who must be selected by the board within five days after disagreement. The board is composed of the president, secretary, and commisioner of the Operators' Association and the district president from each of the districts mentioned of the miners' organization. At this meeting a number of cases were submitted and decided. None of them, however, was of more than local importance.

Pittsburg. Oct. 2.

Coal—The railroad-car supply does not show much improvement compared with a week ago, but the Pittsburg Coal Company, owing to its large number of individual cars, is operating its mines to about 60 per cent. of their capacity. The restriction of production has resulted in a further advance in prices, quotations this week being about as follows: Mine-run, $1.25@1.35; ¾-in., $1.35@1.45; 1¼-in., $1.45@1.55; nut, $1.25@1.35; slack, 85@90c. The demand is unusually heavy. The river mines are in full operation and there are plenty of empty coal boats, barges and flats in the pools and harbor. Mills along the river front are receiving their supply from the river mines and are not affected by the railroad-car shortage.

Connellsville Coke—While there was a sufficient number of railroad cars for all coke shipments the output of the region was a trifle lower than the previous week. The fact that there is an apparent good supply did not bring down prices, and furnace coke is quoted at $2.85@3 and foundry is firm at $3.60@3.75. The production for the week, according to the *Courier,* amounted to 278,041 tons. The shipments aggregated 14,095 cars distributed as follows: To Pittsburg, 4087 cars; to points west of Pittsburg, 8086 cars; to points east of Connellsville, 1922 cars. The production in the Lower Connellsville region amounted to 109,510 tons.

Foreign Coal Trade

Oct. 3.

The foreign trade of Belgium in fuel for the eight months ending Aug. 31 was as follows, in metric tons:

	Imports.	Exports.
Coal	3,484,876	3,325,607
Coke	239,375	571,400
Briquets	87,857	297,893
Total	3,812,108	4,194,900

There was a large increase in imports, which come from Germany and Great Britain. There was a small gain in exports, which are made largely to France.

Iron Trade Review

New York, Oct. 3.

Little change is apparent in the activity of the iron and steel markets. While the September rush of buying is over for the time, new business for next year continues to come in. The heaviest buyers just now are the railroads, with large orders for rails and new equipment. Steel car contracts, especially, will call for large quantities of plates and structural material.

Pig iron is strong, and prices for the first half of next year are apparently fixed at the high level which has been reached in the past two or three weeks.

Not much is said about the ore question for next year. The larger companies, which own their own mines, are probably secure; but furnaces relying on purchased ore will hardly feel safe unless the season closes with a better record than has been made so far. Deficiency of labor is the main reason why many mines have not made as good a showing as was expected.

Some talk of importing pig iron is heard, but it does not seem probable at present that any large quantity will come in. It is said, however, that arrangements have been made in Germany for a considerable quantity of steel billets, which are needed.

Birmingham. Oct. 1.

Alabama furnace companies report light selling of iron during the past week, though there has been a fairly good inquiry. Some estimates are that Alabama iron-makers have disposed of more than 50 per cent. of the probable make for January, February and March next with a strong inquiry for more of the iron and probabilities of sales being made during the next three months for a great portion of what is left and also for the second quarter in the year. The production in Alabama is not much better than what it has been for some time. Extremely inclement weather during the past week disturbed the raw material production and furnaces were more or less handicapped. Even with the best of

weather there is none too much raw material being secured in this district. Announcement was made during the past week that the Woodward Iron Company was placing machinery to quarry a large quantity of limestone near its furnace plant.

Pig-iron quotations are firm. Iron for delivery during the first three months of the coming year is bringing between $15.25 and $16 per ton, No. 2 foundry basis. Spot iron, if there is any, brings $17 per ton. Charcoal iron is quoted at $22, the demand being fairly good.

Chicago. Oct. 1.

Steadiness marks the iron market, with no striking developments in the last week, but a marked tendency on the part of buyers to seek quick-delivery lots at increasing premiums. These lots naturally are small, being chiefly to piece out requirements of melters due to larger requirements by their customers than previously contracted supplies of pig iron can supply. The furnace agents are trying to extend contract orders for next year's deliveries but apparently are not meeting with great success. The average user of pig iron is now inclined to hold back somewhat from large orders reaching ahead six to nine months. He wishes to see where he stands and to be more certain of the market before going ahead.

Quotations on general business continue $20@20.50 for Northern and $15.50@16 Birmingham for Southern ($19.40@19.90 Chicago), on No. 2 iron. Northern charcoal remains at $20@21. The premiums paid for quick delivery range from 25c. to $1.

Locally business in iron and steel products is very good, with the general scarcity of crude steel particularly noticeable here.

Cleveland. Oct. 2.

Iron Ore—The movement of ore during September has not been determined, but preliminary estimates indicate an increase over September a year ago. Small sales of high-grade ores are made at a premium. No sales are yet reported for 1907 delivery. Wild rates are strengthened by slow dispatch of boats, but no advances have been reported.

Pig Iron—Many furnaces are withdrawing from the market for first half of 1907. Northern No. 2 is sold for spot shipment at $20@21 in the Valleys, with first half prices steady at $18.50 in the Valleys. Southern No. 2 is quoted at $15.50 in Birmingham, some furnaces holding for $16. Basic is strong at $18.75 in the Valleys for first half. Bessemer is firm at $19 in the Valleys.

Finished Material—Raw steel is scarce. Sheets are unusually strong, the result of a growing demand. Mills are behind their orders. Bar iron is strong at 1.70@1.75c. Pittsburg. Premature publication of plans overturned a deal for the American Ship-Building Company to buy the Ship-Owners' Dry Dock at Chicago and get, as a result, an order for eight boats for 1908 delivery. Deliveries are slow on plates and the demand is increasing.

New York. Oct. 3.

Pig Iron—The market is strong, though the immediate rush is over. There is still some buying for second-quarter delivery; also some, in small lots, for November and December. Those foundries which are in need of iron have to pay high. This makes the range of prices rather wide, as shown below.

Current quotations for pig iron are for New York or parallel delivery:

Northern:	
No. 1 X foundry	$21@$22
No. 2 X foundry	20.50@21
No. 2 plain	19.75@20.50
Forge pig	17.50@18
Southern:	
No. 1 foundry	20.75@21.50
No. 2 foundry	20@20.75
No. 3 foundry	19@19.75
No. 4 foundry	18.25@19
No. 1 soft	20.75@21.50
No. 2 soft	20@20.75
Gray forge	17.25@18
Basic pig:	
Northern	19.50@20
Virginia	19.25@19.75
Alabama	20@20.50

City or local deliveries are not included in prices, which are for large lots, on dock or cars.

Bars—Bars are 1.695c., tidewater, for common iron, and 1.745c. for refined. Steel bars are quoted at 1.645@1.745c., according to size and conditions of orders. Store trade is steady at 2.50c. delivered.

Structural Material—Demand is good, but not quite as pressing as it has been. Railroad bridge and equipment orders are the chief factor just now.

Rails—Standard rails are unchanged at $28. Light rails are in good demand. Some orders for trolley rails for next spring are coming forward.

Old Material—Dealers and consumers still hold different views, but buyers who want scrap have to pay the price. No. 1 railroad wrought is $20.50@21.50; No. 1 yard wrought, $19.50@20.50; machinery cast, $16.50@17; heavy steel melting scrap, $17@18. Prices are for delivery at wharf or railroad terminal.

Philadelphia. Oct. 3.

Pig Iron—We have had a comparatively quiet week in foundry and forge irons and a better feeling seems to prevail in this market. While only limited purchases have been made, our larger producers say that there are negotiations in progress which will probably result in the acceptance of large orders for delivery next year. Some little business in the way of No. 2 foundry has been closed for early delivery. Forge iron is very strong. In all cases where buyers are urgent they find it necessary to pay what amounts to premium prices. The entire market is somewhat feverish. Quotations are uncertain, as they have been for some time past. The nearest to fair quotations can be given at $22 for No. 1X foundry; $21.50 for No. 2X foundry; $20 for No. 2 plain; $18 for gray forge; $19 for basic and $26 for low phosphorus.

Steel Billets—The extraordinary activity in billets is still a feature of the market and there is a great deal of business hanging fire simply because of the inability of mill people to bind themselves down to deliveries at certain dates. There are buyers here who are in need of immediate deliveries and have offered for $1 per ton above the regular premium prices.

Bars—Bar iron is pretty well sold up. The stores are doing a remarkably good business all through this territory and the mills have as much business as they are able to handle.

Sheets—The principal business reported by the mill people today is in light sheets and in galvanized iron for structural purposes.

Structural Material—The business that has been brought to the attention of our structural-mill people this week has been all small, but the aggregate of business amounts to a nice sum.

Scrap—The scrap market is stronger than usual and buyers are bidding against each other, the result being that quotations do not quote. No. 1 steel scrap is wanted at $18.50; railroad scrap could not be had unless $23 is offered; all other kinds in proportion.

Pittsburg. Oct. 2.

There has been but little change in conditions in the iron and steel markets during the week. Pig iron and steel continue scarce and prices are stronger. Production in finished lines is being restricted, owing to inability to get steel, and a large tonnage of various products intended for delivery this year undoubtedly will go over into the new year. Extraordinary efforts are to to be made this month at all plants of the subsidiary companies of the Steel Corporation and independent concerns to break all records of production. Heavy melting scrap is being substituted for pig iron in steel mills and negotiations are on for large tonnages. The Sharon Steel Company and La Belle Iron Works have each closed contracts for 10,000 tons for deliveries through the year, the price being $17 delivered, which is regarded as a remarkably low rate.

There is an unusually heavy demand for wire products and the output of the plants of the American Steel and Wire Company for September is said to exceed the production of a year ago by over 25 per cent. The announcement that the leading interest had ordered an advance of $1 a ton on all wire products was misleading. The order was merely a withdrawal of concessions of $1 a ton that had been made during the summer months, and the prices established in January are now being strictly observed. They are as follows: Plain

wire, $1.70; galvanized barb wire, $2.30 per 100 lb.; and nails, $1.85 a keg, all f.o.b. Pittsburg.

Steel-car contracts booked within the past two weeks aggregate 40,000. The Pennsylvania Railroad is preparing to place orders for 35,000 additional cars. Steel-rail orders for next year also continue to be placed and negotiations are now on for fully 200,000 tons. Light rails are in great demand and prices have been advanced $1 a ton. It was announced today that there will be no increase in prices of steel bars, though iron bars are selling at $2 and $3 a ton higher than steel bars. The leading steel interests seem determined to keep prices from soaring to abnormal figures, in order to maintain a stable market.

Pig Iron—Sales of all grades of pig iron have been light, but prices are firmer. Bessemer iron cannot be had for delivery this side of July 1 for less than $19, Valley furnaces, and basic at $18.75. For No. 2 foundry $18.50 is quoted for first half and all sales for this year are at a minimum price of $20, Valley. There is but little foundry iron available for shipment before April 1. Malleable bessemer also is in demand and hard to get, 1000 tons having been sold during the week at $20.60, Pittsburg. Gray forge is not in particular demand and prices remain at $18.10@18.35, Pittsburg.

Steel—There have been no transactions of importance in billets and the scarcity continues. Bessemer billets are still quoted at $28@29 and open-hearth at $29@30. Sheet bars are quoted at $30@31. Plates remain at 1.60c., and merchant-steel bars at 1.50c., although one interest is quoting 1.60 cents.

Sheets—The advance in prices reported as probable early this week has not been announced. Premiums, however, are being paid to insure prompt delivery. Black sheets remain at 2.50c. and galvanized at 3.55c. for No. 28 gage.

Ferro-Manganese—The market is easier and 80 per cent. ferro is quoted at $83@85 for any delivery this quarter.

London. Sept. 22.

The production of bessemer steel ingots in Great Britain, as reported by the British Iron Trade Association, for the half-year ending June 30, shows a decrease of 100,267 tons, or 9.8 per cent., as compared with the first half of 1905. The loss was almost all in South Wales and in Cumberland. The figures for the half-year are as below, in long tons:

	1905. Tons.	1905. Per Ct.	1906. Tons.	1906. Per Ct.
Acid	698,836	68.5	634,838	69.0
Basic	321,051	31.5	284,782	31.0
Total	1,019,887	100.0	919,620	100.0

Basic steel shows a slightly greater decrease than acid steel. Partial returns of finished products show the following manufactures from bessemer steel: Rails, 487,134 tons; plates and angles, 14,773; bars, 82,961 tons. In addition there were 81,745 tons sold by the makers in the form of billets, ingots and blooms.

Dusseldorf, Germany Sept. 18.

Imports of iron and steel and of machinery into Germany for the seven months ending July 31 were, in metric tons:

	1905.	1906.	Changes.
Iron and steel	177,474	317,557	I. 140,083
Machinery	49,203	53,020	I. 3,817
Total	226,667	370,577	I. 143,900

The exports for the seven months are reported as below, in metric tons:

	1905.	1906.	Changes.
Iron and steel	1,762,262	2,079,360	I. 317 098
Machinery	166 294	154,910	D. 11,384
Total	1,928,556	2,234,270	I. 305,714

Imports of iron ore for the five months, March to July inclusive, were 2,721,339 tons; of manganese ore, 150,873 tons. Exports of iron ore for the five months were 1,566,718 tons; of manganese ore, 929 tons. The exports of iron ore were chiefly Minette ores from Luxemburg to France and Belgium.

Cartagena, Spain. Sept. 15.

Iron and Manganiferous Ores—Messrs. Barrington & Holt report shipments for the week one cargo, 475 tons dry ore, to Rotterdam; one cargo, 2100 tons manganiferous ore, to Great Britain; two cargoes, 5000 tons manganiferous ore, to Marseilles. There is no change in the market.

Prices are 8s. 10d.@9s. 1d. per ton for ordinary 50 per cent. ore, 9s. 4d.@9s. 7d. for special low phosphorus; 10s. 9d. for S. P. Campanil; 12s. 1d. for specular ore, 58 per cent. Manganiferous ores range from 12s. 9d. for 35 per cent. iron and 12 manganese, up to 15s. for 25 per cent. iron and 17 managanese. All prices are f. o.b. shipping port.

Pyrites—Iron pyrites, 40 per cent. iron and 43 sulphur, is quoted at 10s. 8d. per ton.

Chemicals

NEW YORK, Oct. 3.

Copper Sulphate—Demand is steady, as it has been for some time past. Prices are advancing, in sympathy with metallic copper. The current quotation is $6.40 per 100 lb. for carload lots, and $6.65 for smaller orders.

Nitrate of Soda—The market is very strong with prices up about 5c. for all grades. The demand is exceptionally good with supplies quite weak. A decline in price is not looked for by the large dealers and a still further advance will not be surprising under existing conditions. We quote prices as follows: 96 per cent. for 1906, $2.60@2.65; 95 per cent. for 1907, $2.52@2.57½; 95 per cent. for 1908, $2.45@2.50. 96 per cent. for these years is about 7½c. higher.

Metal Market

New York, Oct. 3.

Gold and Silver Exports and Imports.
At all United States Ports in August and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
Aug. 1906	$ 598.078	$7,935.928	Imp. $7,337,850
" 1905	274,153	3 213 216	" 2,939,063
Year 1906	33.512 040	80.308 039	" 46.795,999
" 1905	41,265.017	24,795,910	Exp. 16,469,107
Silver:			
Aug. 1906	4,049 173	2,738,951	" 1,310,222
" 1905	4 549 485	2,517.274	" 2,032,211
Year 1906	41 847.028	29 693,485	" 12,153,543
" 1905	33,915,751	20,666,993	" 13,248,758

These statements cover the total movement of gold and silver to and from the United States. These figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Movement, New York.
For week ending Sept. 29 and years from Jan. 1.

Period.	Gold. Exports.	Gold. Imports.	Silver. Exports.	Silver. Imports.
Week	$ 970	$8,433,507	$ 737,185	$ 75,357
1906	5,964,713	74,970,741	42,694,365	1,601,752
1905	32,289,943	3,090,535	26,424,821	3,557,324
1904	73,161,064	4,128,567	29,311,383	727,889

Exports of gold for the week were to Panama; of silver to London and Paris. Imports of gold for the week were from London, Paris and Cuba; of silver from South America.

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Sept. 29, gives the following totals, comparisons being made with the corresponding week of 1905:

	1905.	1906.
Loans and discounts	$1,017.630,300	$1,051,172,800
Deposits	1,080,465,100	1,034,059,000
Circulation	54,066,100	45,595,800
Specie	201,506,000	193,327,300
Legal tenders	76,050,300	77,727,800
Total reserve	$277,556,300	$271,055,100
Legal requirements	270,116,275	258,514,750
Surplus reserve	$7,440,025	$12,540,350

Changes for the week this year were increases of $7,290,200 in loans, $2,790,300 in specie, $1,135,500 in legal tenders, $10,807,500 in deposits, $486,300 in circulation and $1,224,425 in surplus reserve.

The following table shows the specie holding, in dollars, of the leading banks of the world:

	Gold.	Silver.	Total.
New York	.....	.....	$193,327,300
England	$170,110,630	.....	170,110,630
France	573,965.505	$209,594,800	783,560,305
Germany	158,135,000	52,710,000	210,845,000
Spain	76,365,000	123,210,000	199,575,000
Netherlands	27,648,000	28,390,000	56,038,000
Belgium	17,315,000	8,665,000	25,980,000
Italy	149,430,000	19,084,500	168,514,500
Russia	553,170,000	27,345,000	580,515,000
Austria	235,075.000	59,740,000	294,815,000
Sweden	19,395,000	.....	19,395,000

The returns of the associated banks of New York are of date Sept. 29, and the others Sept. 28. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York. The New York banks do not separate gold and silver in their reports.

Indian exchange continues strong, the Council bills offered in London being taken at an average of 16.06d. per rupee. The demand for silver in India remains good.

Exports of silver from London to the East are given by Messrs. Pixley & Abell's circular as follows, for the year to Sept. 20:

	1905.	1906.	Changes.
India	£ 4,335,121	£ 12,185,013	I. £ 7,849,892
China	758,688	430,700	D. 327,988
Straits	11,675	1,750	D. 9,925
Total	£ 5,105,484	£ 12,617,463	I. £ 7,511,979

Receipts for the week were £22,000 from the West Indies; £214,000 in bars and £20,000 in Mexican dollars from New York; a total of £256,000. Exports were £150,000 to China, £169,000 in bars and £50,000 in Mexican dollars to India; £369,000 in all.

The silver market continues quite firm, with demand fully up to the supply, and with inquiries from sources quite unexpected.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	$0.53	$0.55
Peruvian soles and Chilean	0.48¼	0.51½
Victoria sovereigns	4.85½	4.87½
Twenty francs	3.87	3.91
Spanish 25 pesetas	4.78	4.80

SILVER AND STERLING EXCHANGE.

Sept.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Oct.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
27	4.83¼	67⅞	31 7/16	1	4.83¼	68⅛	31 9/16
28	4.83½	67¾	31⅛	2	4.83½	68¼	31⅜
29	4.83¼	68⅛	31⅛	3	4.83½	68¾	31⅜

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

Other Metals.

Daily Prices of Metals in New York.

Sept.-Oct.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
27	20 @20¼	19⅜ @19⅝	90⅞	41¼	5.75	6.25 @6.30	6.10 @6.15
28	20 @20¼	19⅜ @19⅝	91¼	41¾	5.75	6.20 @6.25	6.05 @6.10
29	20 @20¼	19⅜ @19⅝	....	41¾	5.75	6.20	6.05
1	20⅛ @20⅜	19⅜ @20	93	42¾	5.75	6.20	6.05
2	20⅛ @20⅜	19⅜ @20	92¾	42⅛	5.75	6.15 @6.20	6.00 @6.05
3	20⅛ @20⅜	19¾ @20	92⅝	42½	5.75	6.15 @6.20	6.00 @6.05

London quotations are per long ton (2240 lb.) standard copper, which is now the equivalent of the former g.m.b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting & Refining Co. for near-by shipments of desilverized lead in 50-ton lots, or larger orders. The quotations on spelter are for ordinary western brands; special brands command a premium.

Copper—The situation is substantially unchanged. The volume of business has been somewhat reduced by reason of the fact that consumers are now fairly well supplied, but it is well that it is so, as producers have disposed of their entire output up to the first of next year, and in some cases even beyond.

The market closes very strong and higher at 20⅛@20½ for lake and 19¾ @20c. for electrolytic in cakes, wirebars or ingots. The average at which business in casting copper was done during the week was 19⅜@19¾, and this grade also closes stronger, sales of carload lots of prime brands being reported as high as 20 cents.

The shortage in the supplies has resulted in a squeeze in the standard market in London, which at one time advanced to nearly £94. Since then there has been a slight reaction, and the close is steady at £92 15s. for spot and £92 10s. for three months. Refined and manufactured sorts are quoted: English tough, £95 10s.@£96 10s.; best selected, £97@£98; strong sheets, £102@£103.

Copper Sheets—The leading manufacturers, Sept. 20, advanced their prices 1c. per lb. on sheet copper, which brings the base price up to 24 cents.

Tin—Following the London lead, prices advanced from day to day and there has been some activity. The market closes firm at 42½ New York, and in London £194 5s. for spot and £193 10s. for three months.

Visible stocks of tin on Oct. 1 are reported as below, in long tons:

	Store.	Afloat.	Total
London	1,395	4,944	6,339
Holland	1,327	183	1,510
United States	1,340	3,020	4,360
Total	4,062	8,147	12,209

United States figures do not include Pacific ports.

Lead—The market is unchanged at 5.75 New York, while in London there has been a further advance, the close being cabled strong at £18 15s. for Spanish and £18 16s. 3d. for English lead.

St. Louis Lead Market—The John Wahl Commission Company telegraphs us as follows on Oct. 3: Lead is quiet, with Missouri brands selling at 5.82½@5.90c., according to brand and delivery.

Spanish Lead Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Sept. 15, that the market has been strong. Pig lead is 84 reales per quintal, silver being paid for at 14 reales per ounce. Exchange is 28 pesetas to £1. The lead price, on current exchange, is equal to £16 15s. 9d. per long ton, f.o.b. Cartagena. Exports for the week were 55 tons desilverized and 324 tons argentiferous lead to Marseilles.

Spelter—Consumers, being well supplied, are holding off. On this account the small lots which came into the market from day to day have made a further depression, and the close is easy at 6c. St. Louis and 6.15 New York.

The London market also has suffered from realization and closes lower at £27 17s. 6d. for good ordinaries and £28 2s. 6d. for specials.

Spanish Zinc Ore Market—Messrs. Barrington & Holt report from Cartagena, Spain, under date of Sept. 15, that there is little present demand for ore, and a number of mines are restricting their output.

Zinc Sheets—The price of zinc sheets is $7.75 per 100 lb. (less discount of 8 per cent.) f.o.b. cars at Lasalle and Peru, in 600-lb. case for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; the lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since Jan. 1, 1906, have been small, the highest price having been $8 on Jan. 6, the lowest $7.65 on May 18.

Antimony—There is no material change in the position of this metal, but prices are a little higher. We quote 22½@23¾ for ordinary brands, and 24½@25½ for specials.

Nickel—Quotations for large lots, New York or other parallel delivery, as made by the chief producer, are 45@50c. per lb. for large orders, according to size of order and terms. For small lots, 50@65c. is charged.

Platinum—The price continues $33 per oz. unmanufactured and $24 for scrap metal.

Minor Metals—For minor metals and their alloys, wholesale prices are, f.o.b. works:

	Per Lb.
Bismuth	$1.50@1.60
Cadmium, 99.5% f. o. b. Hamburg	$1.62
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Chrome (70)	13c.
Ferro-Chrome (7-9% carbon, per lb. Cr.)	9@9½c.
Ferro-Chrome (1% C. for ea. 10% Cr.)	11c.
Ferro-Chrome (60-64% Cr., 3-4% C.	14c.
Ferro-Chrome (60-70% Cr., 1% C. or less)	38c.
Ferro-Molybdenum (50%)	95c.
Ferro-Titanium (20%)	80c.
Ferro-Tungsten (37%)	28c.
Ferro-Vanadium (25-50% per lb. vanadium contents)	$7.20@7.50
Magnesium, pure (N. Y.)	1.50
Manganese, pure 98@99% N. Y.	75c.
Manganese—Copper (30%@70%) N.Y.	45c.
Molybdenum (98@99%, N. Y.)	$1.70
Phosphorus, foreign red (f. o. b. N.Y.)	1.10
Phosphorus, American yellow (f.o.b. Niagara Falls)	59c.
Tungsten (best) pound lots	85c.
Ferro-Silicon (50%) spot. Ex ship Atlantic ports	$93@95 ton.

Variations in price depend chiefly on size and conditions of orders.

Quicksilver—The metal is firm and New York prices are still $41 per flask of 75 lb. for lots of 100 flasks or over, and $42 for small lots down to 10 flasks. For retail quantities, under 10 flasks, pound prices are charged, which work out to about $43 per flask. San Francisco prices

are firm at $39.50 for domestic orders and $38 for export. The London price is £7 per flask, while jobbers are asking £16 18s. 9d.

Aluminum—The chief producer gives list prices for ton lots and over, as follows: No. 1, over 99 per cent. pure, 36c. per lb.; No. 2, over 90 per cent., 34c. Small lots are from 1 to 3c. higher. Granulated metal is 2c. per lb. over price of ingots; rods, 1c. per lb. over ingots. Rolled sheets are 45c. per lb. up, according to size.

Wisconsin Ore Market.

PLATTEVILLE, Sept. 29.

Conditions and prices are about the same as last week. A few isolated camps were cut 50c. per ton. Sixty per cent. ore ranged from $42 to $43, depending on location and quantity. Buyers are apparently quite anxious to take up all ore produced. The Dall ore still commands the highest price, owing principally to the excellent grade that is being turned out of the roasting plant.

The following camps of the Platteville district report ore loaded for the week ending Sept. 29 as follows:

Camps.	Zinc, Lb.	Lead, Lb.	Sulphur, Lb.
Platteville	488,140	.....	.....
Mineral Point	344,460	38,040	69,800
Highland	330,000	.....	.....
Cuba City	172,100	44,800	.....
Linden	148,050	.....	.....
Dodgeville	129,000	.....	.....
Buncombe & Hazel Green	102,000	.....	.....
Livingston	65,000	.....	.....
Rewey	60,000	.....	.....
Harker	47,550	.....	.....
Montfort	.....	.....	100,000
Total for week	1,886,240	82,840	169,800
Year to Sept. 29	55,644,896	2,637,390	3,009,910

Fine weather was a factor in keeping up the production. Cars were scarce, however, and not all the ore sold was loaded.

Missouri Ore Market.

JOPLIN, Sept. 29.

The highest price paid for zinc was $47 per ton on a straight bid, with the assay basis reported by purchasing agents at $41 @43 per ton of 60 per cent. zinc. Average price all grades, $41.82 per ton.

The highest price for lead was $82.50, with medium grades selling at $79@81 per ton. Average price all grades, $79.62.

With the high price of zinc stronger than the assay basis, it is apparent that prices will not recede farther for a few weeks. It may, on the other hand, indicate that buyers have found it necessary to purchase a certain part of the holding stock at higher prices on a straight bid, letting other sellers wait upon a decline a week or two later. The stock in the bins now approximates 5000 tons, the largest since late spring, and outputting conditions are the best of the year, approximating 5800 to 5900 tons per week. This week's shipment was the first for over a month approximating the output.

With the end of September the district value for nine months aggregates $11,189,714, an increase of $1,405,589. The zinc shipment is 18,554 tons and the lead shipment 5963 tons greater. This year's values have averaged $1,243,302 per month, against an average last year of $1,087,124, or a monthly gain of $156,178.

Following are the shipments of zinc and lead from the various camps of the district for the week ending today:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville	4,210,620	1,024,520	$131,508
Joplin	2,331,520	216,470	59,951
Duenweg	772,790	103,100	20,738
Galena-Empire	641,000	186,790	20,018
Neck City	557,170	14,570	13,118
Aurora	776,400	.....	12,466
Alba	476,840	.....	10,728
Spurgeon	309,430	15,060	7,325
Badger	322,440	.....	6,954
Granby	356,000	40,000	6,900
Prosperity	143,920	92,880	6,808
Oronogo	297,110	.....	6,512
Carthage	177,810	.....	4,060
Sherwood	108,860	27,740	3,268
Zincite	78,640	10,300	2,053
Stott City	39,810	.....	856
Totals	11,600,360	1,771,430	$313,183
39 weeks	413,515,660	58,298,650	$11,189,714

Zinc value, the week, $242,660; 39 weeks, $8,956,394.
Lead value, the week, 70,523; 39 weeks, 2,233,320.

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months; the average for zinc being based on the prices of assay basis ores carrying 60 per cent. zinc.

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1905.	1906.	Month.	1905.	1906.
January	52.00	47.38	January	61.50	75.20
February	52.77	47.37	February	57.62	72.83
March	47.40	42.68	March	57.20	73.73
April	42.88	44.63	April	58.00	75.13
May	43.31	40.51	May	58.27	78.40
June	40.75	43.83	June	57.80	80.96
July	43.00	43.25	July	58.00	74.31
August	48.83	43.56	August	58.00	75.36
September	46.75	42.58	September	63.50	79.64
October	47.60	....	October	63.86	....
November	49.55	....	November	68.67	....
December	49.00	....	December	76.25	....

Mining Stocks

NEW YORK, Oct. 3.

The stock markets are still uncertain, and largely professional, though there has been a slight improvement, owing to the prospect of easier money. Amalgamated Copper closed at $112½; American Smelting at $154 for the common; Federal Mining and Smelting at $165¼ for the common. There was one sale of Homestake at $90¼, a fraction above the previous week.

On the curb Nipissing was again prominent, with large sales. It closed around $22. The coppers were active, Greene Consolidated, Furnace Creek, British Columbia and Union leading. Mines Company of America sold largely, closing at $1½, while $5¼ was paid for Tonopah Extension.

On the Consolidated Exchange Standard Consolidated came out, after a long rest, at $2.40. Portland sold at $1.30, and $1.30 was paid for Jim Butler.

Boston. Oct. 2.

Copper shares are getting near the boiling point, and in one or two cases it has already been reached. New records have been made in several cases. Calumet & Hecla is up above $800 per share, which is its highest since the boom of 1898 and 1899. There has been more or less apathy in Amalgamated, but this has not retarded the list from being active and buoyant. North Butte has been the special card, touching $107 today, its record price, against a close at $97 a week back. Butte Coalition has also been a favorite, rising $3.87½ to $41.12½ today. The cause for these advances is in connection with the Amalgamated in some form. Shannon has risen to $14 on heavy transactions and Calumet & Arizona is up $3 to $122. Utah has advanced $2.75 to $67.25 and Osceola $2.50 to $119.

Copper Range spurted $3.25 to $80.75 on buying said to be for inside account. Greene Consolidated, after yielding to $26, recovered to $28.25 today. The company's assets have been increased some $4,000,000 by the actual acquisition of 200,000 shares of Cananea Central, which is quoted above $22 on the local curb. Centennial advanced $3.75 to $27.75, reacting $1, however. Another head will be put in operation at the mill, which will run half time on Centennial rock. Trinity advanced to $12.50. The smelting deal, it is now said, has been turned over to the American Smelting. Mohawk is at its highest, $65, up $2, for the week.

Franklin sold up $1.50 to $26, losing a portion. Old Dominion closes the same as a week back, at $52, and Bingham closed a trifle lower at $34.75. Michigan touched $15.75, Mass $9.75 and Adventure $7. Isle Royale closed a trifle better than a week ago, at $21. Boston Consolidated is off $1.37½ to $31.62½. Amalgamated closed the same as a week ago, at $112.62½.

The curb is even a busier place than the Stock Exchange, and increasing. Nipissing has been the feature, touching $24.12½ ex-dividend today. East Butte spurted to $12.50 today and Davis-Daly to $11.50 per share.

Colorado Springs. Sept. 28.

The Pike Centennial all this week, with Thursday a holiday, has made a very light week on the local exchange, and comparatively few Cripple Creek stocks have changed hands. Portland, which was very active up to the past week, had sales only on one day, at $1.31@1.30. Prices in most cases have had a tendency toward a decline, but nothing particularly noticeable.

San Francisco. Sept. 27.

The Comstock shares have been quiet during the week. Little interest is taken in them by outside buyers, and prices are weak. The new Nevada stocks have been active and in demand, making up the bulk of the transactions on the market. The Goldfield and Manhattan groups were the special features of the week, and were generally strong and well brought.

STOCK QUOTATIONS.

NEW YORK. Week Sept. 29

Name of Company.	High	Low	Clg.	Sales
Amalgamated*	115⅝	109¼	111⅝	799,445
Anaconda*	294½	276½	282	235,650
British Col. Copper	10⅛	9⅞	10⅛	8,200
Butte Coalition*	39⅞	36¼	39⅞	15 000
Cum. Ely Mining	11	10⅛	10⅜	13,900
Greene Gold	2	1⅞	2	460
Greene Gold & Silver	2	1⅜	2	2,895
Guanajuato	5	4⅞	5	1,140
Micmac	5¾	5⅛	5⅜	9,725
Mines Co. of Am	2⅛	1⅞	1½	21 900
Mitchell Mining	5¾	4¾	5¼	9,180
Mont. Sho. Con. (New)	13⅛	13	13	100
Nev. Utah M. & S.	5½	4⅝	4⅞	97,000
Nipissing Mines	21¼	16½	20⅝	180,700
Tennessee Copper	43¾	42	42	1,730
Union Copper	1⅜	1⅛	1⅜	25,800
Utah Apex	8⅛	7⅜	7⅞	1,310

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	155⅜	150½	152¼	65,250
Am. Smelt. & Ref., Pf.	115⅛	113¾	115	4,420
Bethlehem Steel	24	20	20	1,200
Colo. Fuel & Iron	56⅛	52	54	43,210
Federal M. & S., Pf.*	93¾	92⅛	92½	700
Inter. Salt*	39⅞	38¾	39⅛	1,150
National Lead	80	77⅞	78	23,625
National Lead, Pf	101¾	101½	101¾	700
Pittsburg Coal	14¼	14⅛	14⅜	....
Republic I. & S.	38¾	36	37⅛	16,310
Republic I. & S., Pf.	99⅛	97	97	3,400
Sloss-Sheffield	74⅛	73⅝	74½	1,000
Tenn. C. & I.	159	157⅛	159	200
U. S. Red. & Ref	35¼	34	34	400
U. S. Steel	46¼	43⅜	45½	504,080
U. S. Steel, Pf.	106⅞	105	106	35 959
Va. Car. Chem	40	37⅞	38	1,900

BOSTON. Oct. 2.

Adventure	7	6	7	1,910
Allouez	37¾	35	37½	1,405
Atlantic	12¾	11¾	12	730
Bingham	35	33⅜	34¾	5,023
Boston Consolidated	33	31⅝	31⅝	4,735
Calumet & Arizona*	122	118½	122	1,030
Calumet & Hecla*	805	785	805	174
Centennial	27⅜	24	26¾	8,120
Copper Range	80¾	77½	80	11,095
Daly-West	17½	16¼	17	906
Franklin	26¾	24	25	8,902
Granby*	13⅝	13	13¾	2,925
Greene Consolidated*	28¾	26	27⅞	22,899
Isle Royal	21½	20	21	845
Mass	9¾	9	9¾	615
Michigan	15¾	14	15½	2,886
Mohawk	65½	62	65¼	2,500
Mont. Coal & Coke rcts.	2½	2¼	2⅜	271
Nevada	20	19	19½	3,915
North Butte*	107	97	105⅞	19,794
Old Dominion	53	49¾	52	8,431
Osceola	119	115	118½	5,754
Parrot*	27½	26½	27	765
Quincy*	96½	95	95	553
Rhode Island	5¾	5⅜	5½	847
Shannon	14	12	13¾	31,502
Tamarack	100	93	93	
Tecumseh	15	13⅞	14¼	2,939
Trinity	12¾	11½	12	16,120
United Copper, com.	67¼	65½	66¼	4,095
U. S. Oil	10	9⅞	10	210
U. S. Smg. & Ref.	62	59½	61½	5,206
U. S. Smg. & Ref., pfd.	48	46	46½	1,625
Utah Copper	67¼	64	66¼	11,585
Victoria	7½	6	7¼	2,567
Winona	9¾	8¼	9¾	2,720
Wolverine	148	148	148	120
Wyandotte	1¾	1¼	1¼	830

These stocks, not elsewhere quoted, had the following range of prices during the week: (New York) Am. Agri. Chem., 26¾—25½; Comstock, .20—.18; Davis-Daly Est., 10—9⅝; Gold Hill, 5⅜—4¾; Gugg. Exp., 295—290; Rich. Eureka, 7¼—7⅛; Standard Oil, 602—598. (Boston) Ahmeek, 88—85; Am. Zinc, 15½—14¼; Arcadian, 6—5; Ariz. Com'l, 38½—36; Black Mt., 9¼—8½; Cananea, 22¼—18⅝; East Butte, 11¾—10; Keweenaw, 12—11; Majestic, 2¼—2; Raven, .87—.84; Shawmut, 1.00—.70; Superior Cop., 18—17; Superior & Pitts., 21¾—19¼; Troy, 2⅜—1½.

PHILADELPHIA. Oct. 2.

Name of Company.	High	Low	Clg.	Sales.
American Cement	7	6⅞	6⅞	400
Cambria Steel	38¾	37⅛	38⅜	4,608
General Asphalt	9⅛	8	8¼	307
Penn. Steel, pd	108	105½	106¾	29
Philadelphia Co.	52	49	49¾	220
Tonopah Mining	19¾	18¼	19¼	3.746

PITTSBURG. Oct. 2.

Crucible Steel	12⅜	11¾	12½	320
Crucible Steel, Pf.	78¼	78	78¾	740
Harbison-Walker Ref.	14	13	14	
Ohio Tonopah	.26	.25	.25	300
Tonopah Ext	5⅞	5¼	5¼	3,877

COLORADO SPRINGS. Oct. 6.

Name of Company.	High	Low	Clg	Sales
Acacia	13½	13	13	10,000
Dante	5⅛	5	5	4,000
C. C. Con	6½	6¼	6½	....
Doctor Jack Pot	8¾	8⅛	8⅛	6,100
Elkton	49¾	49	49	17,300
El Paso	54½	52⅛	53¼	6,100
Findley	75	75	75	2,500
Gold Dollar	8	7⅛	7⅛	18,900
Gold Sovereign	6⅝	6⅛	6½	16,000
Isabella	20	19⅛	20	5 000
Jennie Sample	9⅜	9	9¼	9,250
Mary McKinney	67	66	66	5,100
Portland	1.35	1.23	1.35	2,400
United Gold Mines	12	11	12	10,000
Vindicator	95	94	94	900
Work	18¾	17	18⅝	35,500

SAN FRANCISCO. Sept. 26.

Name of Company.	High	Low	Clg	Sales
Best & Belcher	.92	.85	.90	600
Caledonia	.41	.29	.40	15,615
Challar	.13	.10	.13	3,500
Con. Cal. & Va	.87	.83	.84	2,950
Crown Point	.11	.08	10	7,000
Gould & Curry	.24	.21	.22	4,100
Hale & Norcross	1.05	1.00	1.05	2,150
Mexican	.72	.66	.70	4,600
Ophir	2.85	2.70	2.70	1,200
Overman	.14	.12	.12	4,400
Potosi	.15	.12	.14	2,900
Savage	1.30	1.15	1.15	3,100
Sierra Nevada	.32	.30	.31	2,500
Bullfrog Mining	.49	.46	.47	4,100
Diamondfield	.38	.35	.36	3,500
Goldfield of Nevada	.64	.64	.64	200
Jim Butler	1.40	1.32	1.35	10,500
Jumping Jack	.59	.54	.56	30,100
Kendall	.70	.61	.68	3,000
MacNamara	.86	.76	.84	27,300
Manhattan Dexter	.62	.57	.60	2,800
North Star	.50	.46	.48	3,650
Original Bullfrog	.14	.12	.13	4,400
Tonopah Belmont	6.00	5.87	5.87	....

Tonopah Stocks. Oct. 3.

(Revised by Weir Bros. & Co., New York.)

	High.	Low.	Last.
Tonopah Mine of Nevada	19 50	19.12½	19.50
Tonopah Montana	2.95	2.92½	2.93
Tonopah Extension	5.37½	5.12½	5.37½
Tonopah Midway	2.20	2.18	2.19
Tonopah West End	2.70	2.65	2.65
Goldfield Mining Co.	.65	.64	.64
Jumbo Mining	1.43	1.40	1.42
Red Top	1.55	1.50	1.52
Sandstorm	.68	.66	.67
Montgomery Shoshone Cons	13.50	13.25	13.50

St. Louis. Sept. 29.

Adams, $0.40 — $0.25; American Nettie, $0.08—$0.06; Center Creek, $2.50—$2.25; Central Coal and Coke, $64.50—$63.50; Central Coal and Coke, pfd., $80.00—$79.00; Central Oil, $60.00—$58.00; Columbia, $4.00—$3.90; Con. Coal, $25.00—$23.50; Doe Run (old stock), $360.00—$310.00; Granite Bimetallic, $0.23—$0.20; St. Joe (old stock), $33.00—$30.00.

LONDON. *(By Cable.*)* Oct. 3.

Dolores, £1 16s. 3d.; Stratton's Independence, £0 3s. 9d.; Camp Bird, £1 7s. 0d.; Esperanza, £3 3s. 9d.; Tomboy, £1 7s. 6d.; El Oro, £1 7s. 6d.; Oroville, £1 1s. 10½d.; Somera, £0 7s. 6d.; Utah Apex, £1 11s. 10½d.; Ariz. Copper, pref., £3 9s. 9d.; Ariz. Copper, def., £3 8s. 3d.

New Dividends.

Company.	Payable.	Rate.	Amt.
Am. Agricul. Chem., pfd.	Oct. 1	$3.00	$544,490
Guanajuato Con.	Oct. 31	0.07½	45,000
International Nickel, pfd.	Nov. 1	1.50	131,123
New Idria, Cal.	Oct. 1	0.24	20,000
Nipissing Mines	Oct. 20	0.25	300,000
Pennsylvania Salt	Oct. 15	3.00	180,000
Standard Con., Cal.	Oct. 15	0.15	26,759
Tenn. Coal, Iron & R. R.	Nov. 1	1.00	225,536
Tenn. Coal, Iron & R.R., pfd.	Nov. 1	2.00	4,960
Tezuitlan Copper	Oct. 1	2.00	20,000
Tonopah Midway	Oct. 1	0.05	50,000
Westmoreland Coal	Oct. 1	2.50	150,000

Assessments.

Company.	Delinq.	Sale.	Amt.
Hale & Norcross, Nev.	Oct. 2	Oct. 25	$0.10
Headlight, Idaho	Oct. 10	Nov. 12	0.01
Jennie Lind, Cal.	Oct. 8	Oct. 24	0.04
Navajo	Sept 29	Oct. 22	0.05
North Belle Isle	Sept. 29	Oct. 22	0.05

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1905.	1906.	1905.	1906.
January	60.690	65.288	27.930	30.113
February	61.023	66.108	28.047	30.464
March	58.046	64.597	26.794	29 854
April	56.600	64.765	26.108	29.984
May	57 832	66.976	26.664	30.968
June	58.428	65.394	26 910	30.185
July	58.915	65.105	27 163	30.113
August	60.259	65.949	27.822	30.529
September	61.695	67.927	28 528	31.483
October	62.034	.....	28.637	.....
November	63 849	.....	29.493	.....
December	64.850	.....	29.977	.....
Year	60.352	.....	27.839	.....

The New York prices are in cents per fine ounces; the London quotation is in pence per standard ounce, 0.925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.			
	1905.	1906.	1905.	1906.	1905.	1906.
Jan	15.008	18 310	15.128	18 419	68.262	78 896
Feb	15.011	17.869	15 136	18 116	67 963	78.147
March	15.125	18.361	15.250	18.641	68.174	81.111
April	14.920	18.375	15.045	18 688	67.017	84.793
May	14.627	18.457	14.820	18.724	64.875	84.867
June	14.673	18.442	14.813	18.719	65.881	83 994
July	14.888	18.190	15.065	18.585	66.887	81.167
Aug	15.664	18.380	15.725	18.706	69.830	83.864
Sept	15.965	19.033	15.978	19.328	69.667	87.831
Oct	16.279	.....	16.332	.....	71.406	.....
Nov	16.599	.....	16.758	.....	74 727	.....
Dec	18.328	.....	18.398	.....	78.993	.....
Year	15.590	.....	15.699	.....	69.465	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2240 lb., standard copper.

TIN IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan	29.325	36.390	July	31.760	37.275
Feb	29.262	36.403	August	32.866	40.606
March	29.523	36.662	Sept	32.095	40.516
April	30.525	38.900	Oct	32.481	.....
May	30.049	43.313	Nov	33.443	..
June	30.329	39.260	Dec	35.835	.....
			Av. year.	31.358	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan	4.552	5.600	July	4.524	5.750
Feb	4.450	5.464	Aug	4.665	5.750
March	4.470	5.350	Sept	4 850	5.750
April	4.500	5.404	Oct	4.850	...
May	4.500	5.685	Nov	5.200	....
June	4.500	5.750	Dec	5.422	.....
			Av., year.	4.707	.....

Prices are in cents per pound. The London average for January, 1906, was £16,850 per long ton; February, £16,031; March, £15,922; April, £15,959; May, £16,725; June, £16,813; July, £16,525; August, £17,109; September, £18,266.

SPELTER.

Month.	New York.		St. Louis.		London.	
	1905.	1906.	1905.	1906.	1905.	1906.
Jan	6.190	6.487	6.032	6.337	25.062	28.225
Feb	6.139	6.075	5.989	5 924	24.594	25.844
Mar	6.067	6.209	5.917	6.056	23.825	24.563
April	5 817	6.078	5.667	5.931	23.813	25.781
May	5.434	5.997	5.284	5.846	23.594	27.000
June	5.190	6.096	5.040	5 948	23.875	27.728
July	5.396	6.006	5.247	5.856	23.938	26.800
Aug	5.706	6.027	5.556	5.878	24.675	26.938
Sept	5.887	6.216	5.737	6.056	26.375	27.563
Oct	6.087	.....	5.934	.....	28.225	.....
Nov	6.145	.....	5.984	....	28.500	...
Dec	6.522	.....	6.374	...	28.719	.....
Year	5.822	.....	5.730	.....	25.433	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2240 lb.) good ordinary brands.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

ABRASIVES—		
Bort, good drill quality, carat		$85.00
Carborundum, f.o.b. Niagara Falls, powd	lb.	.08
Grains	"	.10@.17
Corundum	"	.07@.10
Crushed Steel, f.o.b. Pittsburg	"	.05¾@.06
Emery, in kegs: Turkish flour	"	.02
Grains	"	.04@.05½
Naxos flour	"	.02
Grains	"	.04@.05
Chester flour	"	.01½
Grains	"	.03½@.04½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½@.01½
Grains, in kegs	"	.02½@.02½
Garnet, per quality	sh ton	25.00@35.00
Pumice Stone, Am. Powd. 100	lb.	1.60@2.00
Italian, powdered	"	.01⅞@.01½
Lump, per quality	"	.03@.20
Rottenstone, ground	"	.02½@.03½
Lump, per quality	"	.05@.25
Rouge, per quality	"	.06@.30
Steel Emery, f.o.b. Pittsburg	"	.07½@.07¾
ACIDS—		
Acetic 28%	lb.	.02½
Boric	"	.10@.11
Hydrofluoric, 30%	"	.02¾@.03½
" 48%	"	.06
" 60%	"	.10@.10½
Hydrochloric acid, 20°, per lb		1.25@1.50
Nitric acid, 38°	per lb.	4.25@4 62½
Sulphuric acid, 50°, bulk, per ton		$12 up.
60°, 100 lb. in carboys		.90@1.12½
60°, bulk, ton		18.00@20.00
66°, 100 lb. in carboys		1 00@1 25
66°, bulk, ton		20.00@21.00
Oxalic	"	.06¾@ 07
ALCOHOL—Grain	gal.	2.46½
Refined wood, 95@97%	"	.70@.75
ALUM—Lump	100 lb.	$1.75
Ground	"	1.85
Chrome Alum	lb.	.03¼@.03½
ALUMINUM—Sulphate, com'l.	"	1.25@1.75
AMMONIA—24 deg.	lb.	.04¾@.05½
" 26 "	"	.05@.05¾
AMMONIUM—		
Bromide	lb.	.23
Carbonate	"	.07⅝@.09
Muriate grain	"	.06
Lump	"	.09½@.09¾
Sulphate, 100 lb		3.12½@3.25
Sulphocyanide com	"	.30
" " chem. pure	"	.40
ANTIMONY—needle, lb		.18¾@ 20
ARSENIC—White (nominal)		.06¾@.07
Red	"	.06¼@.06½
ASPHALTUM—		
Barbadoes	per ton.	40.00@80.00
West Indies	"	20.00@60.00
Egyptian	lb.	.06@.07
Gilsonite, Utah ordinary	per ton.	50.00
Trinidad	"	30.00@40.00
California	"	20.00@30.00
BARIUM—		
Carb. Lump, 80@90%	sh. ton.	30.00@35.00
Powdered 80@90%	lb.	.02@.02½
Chloride com'l	ton.	34.00
Nitrate, powdered, in casks	lb.	.06
Sulphate (Blanc Fixe)	"	.02¼
BARYTES—		
Am. Ground	sh. ton.	15.00@21.00
Floated	"	15.00@21.00
Foreign floated	"	21.00
White	"	21.00
BISMUTH—Sub-nitrate	lb.	1.50
BLEACHING POWDER—35%, 100 lb		1.30@1.50
BLUE STONE—(copper sulphate), carload, per 100 lb		6.25
BONE ASH	lb.	.02½@.02½
BORAX	"	.07½@.07½
CALCIUM—Acetate, gray	"	2.35@2.40
Acetate, brown	"	1.60@1.65
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton.	65.00
Chloride, f.o.b. N. Y.	"	13.00@15.00
CEMENT—		
Portland, Am. 500 lb	bbl.	1.55@1.60
Foreign	"	2.50@3.00
"Rosendale," 300 lb	"	.85
(in sacks)		.65
Slag cement	"	.75@1.25
CHROME ORE—		
New Caledonia 50% ex. ship N. Y.	per lg. ton	17.00@19.75
Bricks, f.o.b. Pittsburg, M.	"	175.00
CLAY, CHINA—Am. common ex-dock, N. Y.	"	8.00 up.
Foreign	"	11.00@18.00
COBALT—Oxide	lb.	2.50
COPPERAS—Bulk	100 lb.	$0.47½
In bbls	"	.57½
In bags	"	.52½
CRYOLITE	lb.	.06½
FELDSPAR—Ground best	sh ton.	15.00@20.00
Common		6.00@12.00
FIRE BRICK.		
American	per M.	30.00@40.00
Imported	"	25.00@45.00
St. Louis No. 1	"	16.00
" No. 2	"	14.00
Extra	"	20.00@23.00
FIRE CLAY.		
St. Louis mill	per ton	2.50
FLUORSPAR—		
Domestic f.o.b. shipping port:		
Lump	sh. ton.	8.00@10.00
Ground	"	11.50@13.50
Gravel	"	4.25@4.50
Foreign crude ex. dock		8.00@10.00
FULLER'S EARTH—Lump	100 lb.	.80@.85
Powdered	"	.80@1.25
GRAPHITE—		
American, ore, common	lb.	.01@.10
Artificial	"	.06
Ceylon, common pulv	"	.02¾@.03½
Best, pulverized	"	.04@.08
German, com. pulv	"	.01½@.01½
Best, pulverized	"	.01½@.02
Italian, pulverized	"	.01@.02
GYPSUM—		
Fertilizer	"	7.00
Rock	lg. ton.	4.00
INFUSORIAL EARTH—		
Ground Am. best	"	39.00
French	"	56.00
German	"	56.00@59.00
LEAD—Acetate (sugar of)	lb.	.07½
Nitrate, com'l	"	.07½@.08
MAGNESITE—Greece.		
Crude (95%)	lg. ton.	7.00@8.00
Calcined	sh. ton.	30.00@40.00
Bricks, domes, per qual. f.o.b. Pittsburg	M.	160@200
MAGNESIUM—		
Chloride, com'l	lb.	.01@.01½
Sulphate (Epsom salt)	100 lb.	.90@1.25
MANGANESE—		
Crude powdered:		
70@75% binoxide	lb.	.02
75@85% binoxide	"	.02½
85@90% binoxide	"	.04
90@95% binoxide	"	.05½
Ore, 80%-85%	sh. ton.	27 00@35.00
MARBLE—Flour	sh. ton.	8.00@8.50
MINERAL WOOL—		
Slag, ordinary	"	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
MONAZITE SAND—		
Guar. 97%, with 5% Thorium oxide, nominal	lb.	.08 and up.
NICKEL—		
Oxide, crude, lb. (77%) for fine metal contained		.47
Sulphate, single	lb,	.18@.24
" double	"	.11½@.14
NITRATE OF SODA—100 lb. 96% for 1906		2.60@2.61
95% for 1907		2.52½@2.57½
95% for 1908		2.45@2.50
96% is 7½c higher per 100 lb.		
OZOKERITE—best	lb.	.15
PAINTS AND COLORS—		
Litharge, Am. powdered	"	.07½@.07¾
English glassmakers'	"	.08½@.08¾
Lithopone	"	.03½@.07
Metallic, brown	sh. ton.	19.00
Red	"	16.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02½@.03
French, washed	"	.01½@.02½
Paris green, pure, bulk	"	.21@.23
Red lead, American	"	.07½@.07¾
Foreign	"	.08½@.08½
Turpentine, spirits	gal.	.66½@.67
White lead, Am., dry	lb.	.06¾@.06½
American, in oil	"	.07@.07¾
Foreign, in oil	"	.09¾@.10
Zinc white, Am. extra dry	"	.05⅝@.05½
Foreign, red seal, dry	"	.07½@.07¾
Green seal, dry	"	.07¾@.08½
PHOSPHATES—Acid	.65@67½c per unit	
*Fla., hard rock		7 50
land pebble 68%		4.50@5.00
†Tenn., 78@80%		6.50
78%		6.00
75%		4.50@5.00
68@72%		3.50@4.00
‡So. Car. land rock		4.50
" " river rock		3.00

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

POTASSIUM—		
Bicarbonate crystal	lb.	$0.09@.10
Powdered or granulated	"	.10@.11
Bichromate, Am	"	.08⅛@.08⅜
Scotch	"	.11
Bromide	"	.16
Carbonate (80@85%)	"	.03½@.03½
Caustic, ordinary	"	.04½
Elect. (90%)	"	.05½
Chloride (muriate), 100 lb		1.90
Chlorate, powdered	"	.09½
Crystals	"	09
Cyanide (98@99%)	"	.18@.19
Kainite, long ton, bulk, 8.50; bags, 9.50.		
Permanganate	lb.	.09
Prussiate, yellow	"	.16½@.17
Red	"	.33
Sulphate	100 lb.	2.18½@2.21½
PYRITE—		
Domestic, non-arsenical, furnace size	per unit	11@11½c.
Domestic, non-arsenical, fines, per unit		9@10½c.
Imported non-arsenical, furnace size, per unit		13c.
Imported, arsenical, furnace size, per unit		12@12½c.
Imported fines, arsenical, per unit		8½@9c.
" " non-arsenical, per unit		10½@11c.
Pyrite prices are per unit of sulphur. An allowance of 25c. per ton is made when delivered in lump form.		
SALT—N. Y. com. fine 280 lb. bbl.		.72@1.18
N. Y. agricultural	sh. ton.	3@4.40
SALTPETER—Crude	100 lb.	3.75@4.00
Refined, crystals	"	5.00@5.50
SILICA—		
Ground quartz, ord'ry	sh. ton	10.00@15.00
Best	"	30.00@40.00
Lump Quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Nitrate, crystals	oz.	.43
SODIUM—		
Acetate	lb.	.04½@.04¾
"Alkali," per lb., 58%		.80@.85
Bicarb. soda, per lb		1.25@1.50
Soda, caustic, per 100 lb., 60%		1.85@2.00
" " powdered		.02¾
Salt cake, per 100 lb		.65@.85
Soda, monohydrate, per lb		1½c.
Bichromate	lb.	.06½@.06¾
Bromide	"	.16
Chlorate, com'l	"	.08¾
Cyanide, ("100% KCN")	"	.18@.19
Hyposulphite, Am	"	1.40@1.55
German	"	1.75@2.00
Phosphate	100 lb.	1.85@1.95
Prussiate	"	.10
Sal soda, f.o.b. works	100 lb.	.60
Foreign, f.o.b. N. Y.	"	.75
Silicate, com'l	100 lb.	.75@1.00
Sulphate, com'l, (Glauber's salt)	100 lb.	.40@.45
" " calcined		.65@.85
STRONTIUM—Nitrate	lb.	.07¾@.08¼
SULPHUR—		
Louisiana (prime) to New York, Boston or Portland	ton	20.00
To Philadelphia or Baltimore	"	20.50
Roll	100 lb.	1.85@2.15
Flour	" "	2.00@2.40
Flowers, sublimed	" "	2.20@2.60
TERRA ALBA—French & Eng.	100 lb.	.75@1.00
TALC—Domestic	sh. ton.	15.00@20.00
French, best	"	20.00@25.00
Italian, best	"	35.00 and up
TIN—Bi-chloride, 50%	lb	.12
Crystals	"	.24½
Oxide, lb		.44
URANIUM—Oxide	"	3.50
ZINC—Metallic ch. pure	"	.15
Chloride solution, com'l	"	.02½@.02¾
Chloride, granular	"	.04
Dust	"	.05½@.05¾
Sulphate	"	02½@.02¼

Note—These quotations are for wholesale lots in New York, unless otherwise specified, and are generally subject to the usual trade discounts. Readers of THE ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.

DIVIDENDS.

Metal and Mining Companies—U. S.

Name of Company and Location.		Author-ized Capital	Shares. Issued.	Par Val.	Dividends. Total to Date.	Latest. Date.	Amt.
Alaska Mexican, g.	Al'ka	$1,000,000	180,000	$ 5	$1,428,381	July 1906	$ .30
Alaska Treadwell, g.	Al'ka	5,000,000	200,000	25	8,735,000	July 1906	1.00
Alaska United, g.	Al'ka	1,000,000	180,200	5	216,240	July 1906	0.30
Amalgamated, c.	Mont	155,000,000	1,530,879	100	41,399,524	Aug. 1906	1.75
Am.Sm.&Ref.,com.	U. S.	50,000,000	500,000	100	8,500,000	Oct. 1906	1.75
Am. Sm. & Ref. pf.	U. S.	50,000,000	500,000	100	22,581,553	Oct. 1906	1.75
Am. Smelters, pf. A	U. S.	17,000,000	170,000	100	920,000	Sept. 1906	1.50
Am. Smelters. pf. B	U. S.	30,000,000	300,000	100	1,875,000	Sept. 1906	1.25
Anaconda,c.	Mont	30,000,000	1,200,000	25	30,650,000	Oct. 1906	1.50
Annie Laurie, g.	Utah	5,000,000	25,000	100	465,061	July 1905	.50
Arizona, c	Ariz	3,775,000	3,682,520	.....	6,182,361	Apr. 1906	.05
Atlantic, c	Mich	2,500,000	100,000	25	990,000	Feb. 1905	.02
B. & H., l. z.	Mo	400,000	400,000	1	40,000	Dec. 1905	.01
Beck Tunnel, g.s.l.	Utah	1,000,000	1 000,000	1	155,000	Aug. 1906	.02½
Bingham & N.H.,c.g	Utah	2,000,000	226,000	5	22,600	Sept. 1906	.10
Boston & Montana.	Mont	3 750,000	150,000	25	46,075,000	Aug. 1906	12.00
Bull.Beck.&Cham.g	Utah	1,000,000	100,000	10	2,508,400	July 1906	.10
Bunker Hill & Sull.	Ida	3,000,000	300,000	10	7,146,000	Sept. 1906	.60
Butte & Boston, c.	Mont	2,500,000	200,000	25	1,800,000	Feb. 1904	1.00
Butte Coalition, c.s.	Mont	15,000,000	1,000,000	15	400,000	Sept. 1906	.40
Calumet & Arizonac	Ariz	2,500,000	200,000	10	5,200,000	Sept. 1906	3.50
Calumet & Hecla,c.	Mich	2,500,000	100,000	25	96,350,000	Sept. 1906	20.00
Camp Bird, g., s.	Colo	5,500,000	820,000	5	3,382,500	Feb. 1906	.24
Carisa, c.g.	Utah	500,000	500,000	1	45,000	Sept. 1906	.01
Central Eureka, g.	Cal	400,000	398,425	1	778,921	Mar. 1906	.07
C. K. & N., g	Colo	1 500,000	1,431,900	1	229,104	Dec. 1904	.01
Con. Mercur, g.	Utah	1,000,000	1,000,000	1	1,180,000	Sept. 1906	.02½
Continental, z. l.	Mo	550,000	22,000	25	154 000	Apr. 1906	.50
Copper Range Con.	Mich	38,500,000	383,781	100	3,023,772	Oct. 1906	1.50
Creede United, g.	Colo	2,000,000	1,625,000	1	214 053	July 1909	.00½
Cripple Creek Con.g	Colo	2,000,000	2,000,000	1	180,000	Mar. 1905	.00½
Daly West, g. s. l.	Utah	3,600,000	180,000	20	5,391,000	Sept. 1906	.60
De Lamar, g. s.	Ida	400,000	67,180	5	2,926,370	May 1905	.72
Dillon, g.	Colo	1,250,000	1,250,000	1	21,875	July 1905	.01
Doctor Jack Pot	Colo	3,000,000	3,000,000	1	268,000	July 1906	.00½
Doe Run, l.	Mo	10,000,000	59,062	100	933,010	May 1906	.50
Elkton Con., g.	Colo	3,000,000	2,500,000	1	1,681,960	Sept. 1906	.00½
El Paso, g.	Colo	2,500,000	2,450,000	1	1,022,750	June 1906	.01
Fed. Sm., com.	Idaho	10,000,000	60,000	100	1,448,750	Sept. 1906	4.00
Federal Sm., pf.	Idaho	20,000,000	120,000	100	2,231,250	Sept. 1906	1.75
Findley, g.	Colo	1,250,000	1,250,000	1	325,000	Aug. 1906	.01
Gemini-Keystone	Utah	500,000	5.000	100	1,850,000	July 1906	10.00
Gold King Con	Colo	5,750,370	5,750,370	1	1,407,504	May 1905	.01
Gold Sovereign	Colo	2,000,000	2,000,000	1	10,000	Jan. 1905	.00½
Grand Central, g.	Utah	250,000	250,000	1	1,101,250	July 1906	.06
Gwin Mine, Dev., g.	Cal	1,000,000	100,000	10	35,000	Mar. 1906	.25
Hecla, s. l.	Idaho	250,000	1,000,000	0.25	700,000	July 1906	.02
Homestake, g.	S. D.	21,840,000	218,400	100	14,988,550	Sept. 1906	.50
HornSilver,g.s.c.z.l	Utah	10,000 000	400,000	25	5,502,000	Sept. 1906	.05
Inter'l Nickel, pf.	N. Y.	12,000,000	87,415	100	393,368	Nov. 1906	1.50
Iron Silver	Colo	10,000,000	500,000	20	3,800,000	Oct. 1906	.20
Jamison, g.	Cal	3,900 000	390,000	10	247,270	July 1906	.03
Jerry Johnson.	Cal	2,500,000	2,500,000	1	61,700	Apr. 1906	.03
Kendall, g.	Mont	2,500,000	500 000	5	630,000	July 1906	.03
Liberty Bell,g. s.	Colo	700,000	130,551	5	110,857	Jan. 1906	.15
Lightner, g.	Cal	125,000	102,255	1	295,694	Aug. 1905	.05
Mammoth, g. s. l.	Utah	10,000,000	400,000	25	2,060,000	Sept. 1906	.05
Mary McKinney, g.	Colo	1,500,000	1,304,252	1	645,254	July 1906	.03
Mohawk, c.	Mich	2,500,000	100,000	25	500,000	July 1906	3.00
Mont. Ore Purch.	Mont	2,500,000	80,833	25	6,608,119	Apr. 1906	10.00
Monument, g.	Colo	300,000	300,000	1	27,124	Apr. 1905	.01
Nevada Keystone, g	Nevada	1,000,000	638,877	1	61,790	Feb. 1904	.03
New Century, z., l.	Mo	150,000	150,000	1	25,500	July 1906	.01
New Idria, q	Cal	500,000	100,000	5	860,000	Oct. 1906	.20
New Jersey, z.	U. S.	10,000,000	100,000	100	8,400,000	Feb. 1906	3.00
North Butte	Mont	6,000,000	400,000	15	2,600,000	Sept. 1906	2.00
North Star, g	Cal	2,500,000	250,000	10	1,186,989	Sept. 1906	.20
Northern Light,g.s.	Utah	2,000,000	400,000	5	20,000	Feb. 1904	.05
Old Dominion Cop.	Ariz	7,500,000	281,589	25	280,843	May 1906	.50
Old Gold	Colo	2,101,150	2,101,150	1	10,506	Mar. 1906	.05
Ophir, g. s	Nevada	302,400	100,800	3	1,797,400	July 1904	.25
Osceola, c	Mich	2,500,000	96,150	25	5,785,700	July 1906	6.00
Parrot, c,s.	Mont	2,300,000	229,850	10	6,577,800	Sept. 1906	.25
Pennsylvania, g.	Cal	5,150,000	51,500	100	284,925	July 1905	.10
Platteville, l. z.	Wis.	20,000	500	40	89,500	Oct. 1905	10.00
Portland, g.	Colo	3,000,000	3,000,000	1	7,267,086	July 1906	.05
Quicksilver, pf.	Cal	4,500,000	43,000	100	1,931,411	May 1903	.50
Quilp, g	Wash	1,500,000	1,500,000	1	15,000	Apr. 1904	.01
Quincy, c	Mich	2,500,000	100,000	25	16,220,000	Sept. 1906	2.50
Red Bird, g. s. c.	Mont	1,500,000	300,000	5	72,000	Dec. 1904	.01
Rob Roy, z.	Mo	15,000	15,000	1	9,600	May 1906	.03
Rocco Homest'k,l.s.	Nevada	300,000	300,000	1	112,000	Dec. 1905	.02
Sacramento, g, q.	Utah	5,000,000	1,000,000	1	235,000	July 1906	.00½
Salvator, g. s. l.	Utah	200.000	200,000	1	6,500	Aug. 1904	.01
St. Joseph, l.	Mo	20,000,000	1,000,000	10	4,658,357	June 1906	.15
Silver Hill, g. s.	Nevada	108,000	108.000	1	59,400	Feb. 1906	.05
Silver King, g. s. l.	Utah	3,000,000	150,000	20	10,275,000	July 1906	.33½
Spearfish, g.	S. D.	1,500,000	1,500,000	1	165,500	Jan. 1905	.01½
Standard Con., g. s.	Cal	2,000,000	178,394	10	4,204,933	Oct. 1906	.15
Stratton'sIndepend	Colo	5,500,000	1,000,007	5	4,895,865	Apr. 1906	.12½
Tamarack, c	Mich	1,500,000	60,000	5	9,000,000	July 1906	2.00
Tennessee, c.	Tenn	5,000,000	175,000	25	875,000	July 1906	1.25
Tomboy, g. s.	Colo	1,750,000	300,000	5	900,000	June 1906	.48
Tonopah of Nev.	Nevada	1,000,000	1,000,000	1	1,950,000	July 1906	.35
Tonopah Belmont.	Nevada	2,000,000	1,295,007	1	129,500		.10
Tonopah Ext'nsion	Nevada	1,000,000	928,433	1	278,530	Apr. 1906	.15
Tonopah Midway	Nevada	1,000,000	1,000,000	1	250,000	Oct. 1906	.05
Uncle Sam, g.s.l.	Utah	500,000	500,000	1	125,000	Sept. 1906	.01
United Cop. com	Mont	75,000,000	450,000	100	2,812,500	July 1906	1.75
United, c. pf	Mont	5,000,000	50,000	100	1,200,000	May 1906	3.00
United, z. l., com	Mo	500,000	92,400	5	27,450	Oct. 1903	.05
United, z. l., pf	Mo	500,000	19,556	25	228,124	July 1906	.50
United, (Crip'le C'k)	Colo	5,000,000	4,009,100	1	280,071	Apr. 1905	.00½
United Verde, c.	Ariz	3,000,000	300,000	10	17,085.322	Dec. 1904	.75
Un.States,pf.g.s.c.l*	Utah	37,500,000	750,000	50	1,968,750	Oct. 1906	.87½
U.S. Red. & Ref. Pf.	Colo	4,000,000	39,458	100	828,618	Oct. 1906	1.50
Utah, g.	Utah	1,000,000	100,000	10	230,000	July 1906	.01
Utah Con., c.	Utah	1,500,000	300,000	5	5,136,000	July 1906	2.50
Victoria, Utah	Utah	250,000	250,000	1	57,000	July 1906	.04
Vindicator Con., g.	Colo	1,500,000	1,500,000	1	1,470,000	July 1906	.03
Wolverine, c.	Mich	1,500,000	60,000	25	3,450,000	Oct. 1906	9.00
Work, g.	Colo	1,500,000	1,500,000	1	30,000	July 1906	.01
Yankee Con.	Utah	500,000	500,000	1	112.500	June 1906	.02½

*Previous to consolidation $1,436,250 were divided.

Coal, Iron and Other Industrials—United States.

Name of Company and Location.	Author. ized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Ala. Con., C. & I., pf.	Ala	$2,500,000	24,638	100	$905,265	May 1905	$1.75
Allis-Chalmers, pf.	U. S	25,000,000	200,000	100	3,213,750	Feb. 1904	1.75
Amer. Ag. Chem., pf.	U. S	20,000,000	181,530	100	6,831,280	Oct. 1906	3.00
American Cement.	Pa.	2,000,000	200,000	10	948,000	July 1906	.30
American Coal.	Md	1,500,000	50,000	25	1,820,000	Sept. 1906	1.25
Associated Oil.	Cal	21,000,000	21,000,000	1	630,000	Aug. 1905	.01½
Bethlehem Steel, pf.	Pa.	15,000,000	150,000	100	525,000	Feb. 1906	1.75
Bon Air C. & I., pf.	Tenn.	2,500,000	18,803	100	249,757	Oct. 1904	1.50
Cambria Steel	Pa.	50,000,000	900,000	50	7,650,000	Oct. 1906	1.00
Caribou Oil.	Cal	100,000	80,000	1	56,000	July 1905	.07
Central C. & C., com.	Mo	5,125,000	51,250	100	1,768,125	July 1906	1.50
Central C. & C., pf.	Mo	1,875,000	18,750	100	1,218,750	July 1906	1.25
Central Oil	W. Va.	1,500,000	60,000	25	182,500	May 1904	.25
Claremont Oil.	Cal	500,000	450,000	1	58,500	June 1905	.01
Col. & Hock. C. & I.	Ohio	7,000,000	69,244	100	173,086	Feb. 1905	.25
Consolidated Coal	Ill.	5,000,000	50,000	100	350,000	July 1904	1.00
Consolidation Coal	Md	10,250,000	102,500	100	8,289,150	July 1906	1.50
Crucible Steel, pf	Pa.	25,000,000	250,000	100	1,000,000	Sept. 1906	1.50
Empire S. & I., pf.	N. J	5,000,000	25,000	100	562,500	July 1906	1.50
Fairmont Coal,	W. Va.	12,000,000	120,000	100	840,000	Feb. 1906	2.00
Four Oil	Cal	500,000	300,000	1	105.406	July 1905	.01
General Chem. Com.	U. S.	12,500,000	74,103	100	1,596,919	Sept. 1906	2.00
General Chem., pf.	U. S.	12,500,000	100,000	100	4,225,178	Oct. 1906	1.50
George's C'k Coal	Md	2,500,000	22,000	100	1,188,000	July 1904	3.00
Home Oil.	Cal	100,000	100,000	1	507,500	Oct. 1904	.02½
Ill. Crude Oil	Cal	200,000	200,000	1	12,500	Dec. 1904	.01½
Imperial Oil	Cal	1,000,000	100,000	100	880,000	July 1905	.20
International Salt.		30,000,000	182,280	100	744,780	Sept 1906	1.00
Jeff. & Cl'f C. & I, cm	Pa.	1,500,000	15,000	100	330,000	Aug. 1905	5.00
Jeff. & Cl'f. C. & I.,pf	Pa.	1,500,000	15,000	100	825,500	Aug. 1906	2.50
Kern River Oil	Cal	2,000,000	20,000	100	39,500	May 1905	.13
Lehigh Coal & Nav.	Pa.	14,345,650	346,897	50	23,533,303	Nov. 1905	2.00
Maryland Coal,pf.	Md	2,000,000	18,850	100	1,442,560	June 1906	4.00
Monon R. Coal, pf.	Pa.	10,000,000	100,000	100	3,154,945	Jan. 1906	.97
Monte Cristo Oil.	Cal	500,000	500 000	1	120,000	July 1905	.01
National Carbon, pf.	U. S.	4,500,000	45,000	100	2,047,500	May 1905	1.75
National Lead, com.	N. Y.	15,000,000	149,054	100	1,639,594	Oct. 1906	1.00
National Lead, pf.	N. Y.	15,000,000	149,040	100	15,540,868	Sept. 1906	1.75
Nat'l Steel & Wire,pf.	N. Y.	5,000,000	25,778	100	631,561	May 1906	1.75
New Central Coal	Md	1,000,000	50,000	20	310,000	Nov. 1905	.40
Oil City Petroleum	Cal	500,000	500,000	1	55,000	July 1905	.00½
Pacific Coast Borax	Cal	2,000,000	19,000	100	2,086,500	Aug. 1905	1.00
Peerless Oil.	Cal	1,000,000	92,000	10	396,320	May 1905	.14
Penna. Salt.	Pa.	3,000,000	60,000	50	13,988,000	Oct. 1905	3.00
Penna. Steel.	Pa.	25,000,000	168,214	100	5,849,497	Nov. 1905	3.50
Phila. Gas, com	Pa.	28,953,029	579,061	50	6,684,142	Nov. 1905	.75
Phila. Gas, pf.	Pa.	5,744,813	114,896	50	1,583,505	Mar. 1905	1.25
Pittsburg Coal, pf.	Pa.	32,000,000	297,010	100	11,434,962	Apr. 1905	1.75
Pocahontas Coll., pf.	W. Va.	1,500,000	15,000	100	370,000	May 1906	1.50
Republic I. & S., pfd.	Ill.	25,000,000	204,169	100	2,005,648	Oct. 1906	3.75
Sloss-Sheffield, com.	Ala	7,500,000	75,000	100	750,250	Oct. 1906	2.50
Sloss-Sheffield, pf.	Ala	20,000,000	67,000	100	2,976,250	Oct. 1906	1.75
Somerset Coal.	Pa.	4,000,000	40,000	100	80,000	Feb. 1904	2.00
Standard Oil.	U. S.	100,000,000	970,000	100	309,585,000	Sept. 1906	6.00
Tenn. C. & I., com	Tenn	22,553,600	225,536	100	2,680,889	Nov. 1906	1.00
Tenn. C. & I., pf.	Tenn	248,000	2,480	100	375,130	Nov. 1906	2.00
Texas & Pacific Coal.	Texas	2,000,000	20,000	100	1,930,000	Mar. 1905	2.00
Thirty-three Oil.	Cal	500,000	100,000	5	430,000	July 1905	.10
Union Oil	Cal.	10,000,000	100,000	100	1,118,766	May 1905	.50
Union National Gas.	Pa.	9,000,000	90,000	100	1,260,000	Apr. 1905	2.00
U. S. SteelCorp.,cm.	U. S	550,000,000	5,083,025	100	58,444,003	Oct. 1906	1.00
U. S. Steel Corp., pf.	U. S	360,281,100	3,603,141	100	162,234,470	Aug. 1906	1.75
Va. Carolina Ch., cm.	U. S	38,000,000	279,844	100	3,678,829	June 1903	1.25
Va. Carolina Ch., pf.	U. S	20,000,000	180,000	100	11,100,869	Oct. 1906	2.00
Westmoreland Coal.	Pa.	3,000,000	60,000	50	8,580,000	Oct. 1905	2.50

Canada, Mexico, Central and South America.

Name of Company and Location.	Author-ized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Amistad y Conc'rdia.	Mex	$480,000	9,600	50	$258,064	Jan. 1905	$1.71
Butters' Salvador, g.	Salv	750,000	150,000	5	600,000	Apr. 1905	.25
Cariboo McKin'y, g.	B. C.	1,250,000	1,250,000	1	546,837	Feb. 1904	.04
Carmen, g. s.	Mex	27,500	1,100	25	117,437	Jan. 1905	2.37
Consolidated M & S.	B. C.	5,500,000	46,988	100	234,480	Aug. 1906	2.50
Copiapo, c.	Chile	1,125,000	112,500	10	3,000,900	Oct. 1904	1.20½
Crow's Nest Pass	B. C.	3,500,000	140,000	25	1,581,148	Apr. 1906	.62½
Dominion Coal, com.	N. S.	15,000,000	150,000	100	1,050,000	Dec. 1903	1.75
Dominion Coal, pf.	N. S.	3,000,000	30,000	100	3,330,000	Jan. 1906	4.00
Dos Estrellas, g. s.	Mex	150,000	3,000	50	1,020,555	July 1905	13.65
El Oro, g. s.	Mex	5,750,000	1,080,000	5	2,708,800	July 1904	.15
Esperanza, s. g.	Mex	2,275,000	455,000	5	3,227,249	July 1906	1.23
Granby Con.	B. C.	15,000,000	1,350,000	10	1,348,630	Sept. 1906	.30
Greene Con., copper	Mex	8,640,000	864,000	10	5,123,000	Sept. 1906	.40
Greene Con., gold.	Mex	5,000,000	500,000	10	300,000	July 1905	.20
Guanajuato	Mex	3,000,000	540,000	5	33,750	July 1906	.06½
Guggenheim Expl.	Mex	17,000,000	105,000	100	2,572,500	Oct. 1906	1.75
LeRoi No. 2, g.	B. C.	3,000,000	120,000	25	630,000	July 1906	.24
Mexican Coal & Coke	Mex	5,000,000	50,000	100	600,000	Dec. 1905	3.00
Mex. Con. M. & S. Co.	Mex		240,000		240,000	July 1906	.50
Mines Co. of Am.	Mex	2,000,000	2,000,000	1	2,325,000	Sept. 1906	.05
N. Y. & Hond. Ros	C. A.	1,500,000	150,000	10	2,137,500	Aug. 1906	.20
Nipissing, S. Co.	Ont	6,000,000	1,200,000	5	480,000	Oct. 1906	.25
North Star.	B. C.	1,500,000	1,300,000	1	351,000	Dec. 1904	1.00
N. S. St. & Coal, com.	N. S.	5,000,000	49,703	100	788,600	Nov. 1904	2.00
N. S. St. & Coal, pf.	N. S.	1,030,000	10,300	100	329,600	July 1906	2.00
Penoles*.	Mex	250,000	2,500	100	7,763,375	June 1906	20.00
Platanillo.	Mex	500,000	206,989	1	5,580	Sept. 1906	.00½
Reco, g. s. l.	B. C.	1,000,000	958,000	1	327,082	Apr. 1906	.02
Slocan Star.	B. C.	500,000	500,000	1	575,000	Dec. 1904	.05
St. Eugene Con.	B. C.	3,500,000	3,202,000	1	402,120	Oct. 1905	.02
Tezuitlan Copper	Mex	1,000,000	10,000	100		Oct. 1906	2.00
Tilt Cove, c.	N. F.	1,000,000	89,000	2	21,360	Jan. 1905	.48
Tyee, c.	B. C.	940,000	180,000	5	136,800	Dec. 1904	.24

*Mexican Currency.

THE MINING INDEX.

The editors of this paper read all the important publications of the world that relate to mining and the treatment of minerals. This index is published as a reference for all interested and to make it impossible for readers of the ENGINEERING AND MINING JOURNAL to miss any important article published anywhere.

We will undertake to furnish a copy of any article (if in print) in the original language, for the price quoted. Where no price is quoted the cost is unknown. These papers are not kept in stock, but must be ordered from the publisher; hence there will be some delay for foreign papers.

No accounts can be opened for these small amounts, but remittance must be sent with order. For the convenience of those making small but frequent remittances, coupons are furnished at the following prices: 20 cents each, six for $1.00, thirty-three for $5.00 and one hundred for $15.00. This arrangement will be especially appreciated by foreign readers and men in distant mining camps. Where remittances are made in even dollars we will return the excess over an order in coupons upon request.

ALUMINUM.

691—CASTING ALUMINUM in Metal Molds. (Brass Wld., Aug., 1906). Shows the result of certain massive castings in metal, but as a rule, sand is preferred for this class of work. 20c.

ASPHALT.

692—OZOKERITE DEPOSITS in Utah. J. A. Taff and C. D. Smith. (U. S. Geol. Surv., Bull. No. 285, 1906; 3 pp.) Describes the occurrences of asphalt in Utah.

BARYTES.

693—BARYTES—The Production of Barytes in 1905. E. C. Eckel. (Extract from Mineral Resources of the U. S., Calendar Year 1905, 3½ pp.) Gives statistics of production and commerce in barytes in the United States.

694—IDAHO—A New and Large Deposit of Barite in Idaho. A. Lakes. (Mg. Rep., Aug. 16, 1906.) Notes the occurrence of barytes in the Wood river region of Idaho. 20c.

CEMENT.

695 — TENNESSEE-VIRGINIA— Cement Resources of the Cumberland Gap District, Tenn.-Va. E. C. Eckel. (U. S. Geol. Surv., Bull. No. 285, 1906; 2½ pp.) Describes the rocks suitable for the manufacture of cement in eastern Tennessee.

696—WASHINGTON—Cement Resources of Washington. H. Landes. (U. S. Geol. Surv., Bull. No. 285, 1906; 6½ pp.) Describes the occurrence of rocks suitable for the manufacture of portland cement in the various counties of Washington.

CLAYS.

697—BENTONITE of the Laramie Basin, Wyoming. C. E. Siebenthal. (U. S. Geol. Surv., Bull. No. 285, 1906; 3 pp.) Describes the occurrence (with analyses) of bentonite in Wyoming, together with its uses and value.

698—CLAY RESOURCES of Northwestern Kentucky. W. C. Phalen. (U. S. Geol. Surv., Bull. No. 285, 1906; 5½ pp.) Describes the varieties of clay found in northeastern Kentucky.

699—CLAYS AND SHALES in Central Pennsylvania. G. H. Ashley. (U. S. Geol. Surv., Bull. No. 285, 1906; 3 pp.) Notes on the occurrence of various clays in central Pennsylvania, including the well-known Clearfield county flint-clay area.

700 — CLAYS of Cape Cod, Massachusetts. M. L. Fuller. (U. S. Geol. Surv., Bull. No. 285, 1906; 9 pp.) Describes the occurrence and character of clays in Barnstable Co., Mass.

701—CLAYS of Garland County, Kansas. E. C. Eckel. (U. S. Geol. Surv., Bull. No. 285, 1906; 3 pp.) Describes the clay resources of the vicinity of Hot Springs, Arkansas.

702 — CLAYS of the Penobscot Bay Region, Maine. E. S. Bastin. (U. S. Geol. Surv., Bull. No. 285, 1906; 3½ pp.) Describes the occurrence and character of clays in southern Maine.

703—CLAYS of Western Kentucky and Tennessee. A. F. Crider. (U. S. Geol. Surv., Bull. No. 285, 1906; 10½ pp. and map.) Describes the varieties of clay found in western Kentucky and Tennessee.

COAL AND COKE.

704—ALABAMA—The Warrior Coal Basin in the Birmingham Quadrangle, Alabama. C. Butts. (U. S. Geol. Surv., Bull. No. 285, 1906; 11½ pp. and map.) Geological description of the numerous coal seams in northern Alabama.

705—ALASKA—Distribution and Character of the Bering River Coal. G. C. Martin. (U. S. Geol. Surv., Bull. No. 284; 12 pp. and 1 map.) Describes the stratigraphy and the location of workable coal seams in this district, with a statement of the quality of the coal.

706—ALASKA—Geology and Coal Resources of the Cape Lisburne Region, Alaska. A. J. Collier. (U. S. Geol. Surv., Bull. No. 278; 54 pp.) Outlines the geology and paleontology of the district, and describes development work that has been done on the coal deposits.

707—ALASKA—Markets for Alaska Coal. G. C. Martin. (U. S. Geol. Surv., Bull. No. 284; 11 pp.) Review of the coal mining industry of Alaska.

708—ALASKA—Preliminary Statement on the Matanuska Coal Field. G. C. Martin. (U. S. Geol. Surv., Bull. No. 284; 13 pp.) Describes the geology of the district and the character of the various seams of coal found there.

709—ALASKA—The Herendeen Coal Field. S. Paige. (U. S. Geol. Surv., Bull. No. 284; 8 pp.) Describes the geology of the district and the character of the various seams of coal found there.

710—CALIFORNIA—Coal in the Mount Diablo Range, Monterey County, Cal. R. Arnold. (U. S. Geol. Surv., Bull. No. 285, 1906; 2½ pp.) Describes the occurrence of coal in California, notable for its occurrence in the Lower Miocene beds.

711—CALORIMETER—Notes on the Calibration of a Fuel Calorimeter. C. J. Evans. (Engineering, Aug. 31, 1906.) Describes a method for standardizing the results observed in a calorimeter on the Thomson principle. 40c.

712—COAL HANDLING—Vessel Loading Machines. (Browning's Indus. Mag., Aug., 1906; 17½ pp.) Describes and illustrates the various types of apparatus used for unloading coal by the carload. 20c.

713—COAL MINING METHODS in the Western Interior Coal Fields. W. R. Crane. (Mines & Min., Sept., 1906; 3 pp.) Conclusion of article previously indexed, describing the methods of mining adopted in the above fields. 40c.

714—COAL TESTING—Determination of the Heat of Combustion of Some Coal by the Parr Calorimeter. S. S. Sadtler. (Jl. Franklin Inst., Sept., 1906; 4½ pp.) Outlines an improvement on the usual method of determining the calorific power of coal by the Parr apparatus. 60c.

715—COAL TESTING. R. C. Wild. (Elec. Rev., Aug. 17, 1906.) Describes a simple calorimeter for determining the thermo-capacity of coal. 20c.

716—COKE—New Battery at the Camden Coke Works. (Iron Tr. Rev., Sept. 13. 1906; 2½ pp.) Describes the method of operation employed at the above new plant for the production of by-product coke. 20c.

717—COKE OVENS—Beehive Oven Construction. H. N. Eavenson. (Mines & Min., Sept., 1906; 2½ pp.) Gives detailed drawings and description of the construction of beehive coke ovens in the Pittsburg and Connellsville coke regions. 40c.

718—COLLIERY SURVEYING and Office Methods. F. W. Parsons. (Eng. & Mg. Jl., Sept. 8, 1906.) An outline of the methods of surveying and computation in coal mines. 20c.

719—COLORADO—Anthracite Coal Mining in Colorado. R. M. Hosea. (Eng. & Mg. Jl., Sept. 1, 1906; 2½ pp.) Describes the only plant now producing anthracite coal west of Pennsylvania. 20c.

720—COLORADO—The Yampa Coal Field, Routt County, Colo. N. M. Fenneman and H. S. Gale. (U. S. Geol. Surv., Bull. No. 285, 1906; 13½ pp. and map.) A description of the coal occurrences in the Yampa coal field, with analyses of the coal.

721—COLORADO AND NEW MEXICO.—The Durango-Gallup Coal Field of Colorado and New Mexico. F. C. Schrader. (U. S. Geol. Surv., Bull. No. 285, 1906; 16 pp. and map.) A catalog of the coal occurrences in this large Colorado-New Mexico field.

722—COMBUSTION of Bituminous Coal. J. M. Hartman. (Engineer, Aug. 15, 1906.) An exposition of the processes that occur during the burning of soft coal. 20c.

723—COMBUSTION—The Effect of Altitude upon Combustion. C. M. Palmer. (Power, Sept., 1906.) Tabulates the results of tests on the thermo-capacities of coal at various altitudes, showing the increased amounts of fuel required to produce similar results at various heights. 20c.

724—COMBUSTION—Theory of Combustion. E. J. Stoddard. (Engineer, Aug. 15, 1906.) General remarks on thermo-reaction and thermo-temperatures. 20c.

725—ELECTRIC POWER in Coal Mines. (Jl. of Elec., Power & Gas, Aug. 11, 1906.) Describes the electric equipment of the Bradford colliery, near Manchester, England. 20c.

726—ELECTRICAL MACHINERY for Mines. Safeguards Against Fire and Explosion. Geo. Farmer. (Cassier's Mag., Sept., 1906; 3½ pp.) Outlines the various precautions to be taken to prevent accident from mining machinery in gassy coal mines. 40c.

727—EXPLOSIVES—Schedule of Permitted List of Explosives for Use in Coal Mines. (Iron & Coal Tr. Rev., Aug. 17, 1906.) Catalogs the explosives that are permitted in British coal mines, together with their characteristics. 20c.

728—FIRE at the Cambrian Collieries. L. W. Llewelyn. (Coll. Guard., Aug. 17, 1906.) Paper read before the So. Wales Inst. of Engrs., July 17, 1906, describing the conditions surrounding this serious fire, with the methods of rescuing the workmen and subduing the conflagration. 20c.

729—FIRE—The Warrior Run Colliery Fire. M. S. Hacita. (Eng. & Mg. Jl., Sept. 8, 1906.) A short description of the way in which the Warrior Run colliery fire was subdued and an ingenious method by which the condition of the fire was ascertained by analyzing the escaping gases. 20c.

730—FUEL BURNING—Notes on the Burning of Small Anthracite Coal. E. H. Peabody. (Elec. Wld., Sept. 1, 1906.) Outlines a procedure to be followed in the burning of fine coal under boilers. 20c.

731—FUEL BURNING—Some Characteristics of Coal as Affecting Performance with Steam Boilers. W. L. Abbott. (Paper read before the Western Soc'y of Engrs., Sept. 5, 1906.) Shows how the efficiency of coal burning is influenced by the size of the coal and its percentage of ash, and by the thickness of the burning bed in the firebox. 60c.

732—FUEL BURNING—The Burning of Cheap Fuels. (Elec. Wld., Sept. 1, 1906.) Describes a number of plans by which inferior fuel can be mechanically consumed. 20c.

733—HAULAGE—Recent Developments in Electric Mine Haulage. (Browning's Indus. Mag., Aug., 1906; 5 pp.) Describes the latest improvements in electric hauling. 20c.

734—ILLINOIS—Mines of the Mt. Olive & Staunton Coal Co., at Staunton, Ill. (Elec. Mg., Aug., 1906; 12 pp.) Description of certain Illinois coal mines, in which electricity is very largely employed. 20c.

735—KENOVA QUADRANGLE—Coal Resources of Kenova Quadrangle. W. C. Phalen. (U. S. Geol. Surv., Bull. No. 285, 1906; 9½ pp.) Catalogs the occurrences of coal in this northeastern part of Kentucky.

736—LIGNITE—The North Dakota-Montana Lignite Area. A. G. Leonard. (U. S. Geol. Surv., Bull. No. 285, 1906; 14 pp.) Notes the stratigraphy of the coal measures in western North Dakota.

737—MINING LAW—The Bituminous Mining Law of Pennsylvania and Suggestions in Detail for its Improvement. C. Dixon. (Mines & Min., Sept., 1906.) A discussion of the deficiencies in the Pennsylvania mine laws and suggestions as to their betterment. 20c.

738—MONTANA—Development of the Bear Creek Coal Fields, Montana. C. A. Fisher. (U. S. Geol. Surv., Bull. No. 285, 1906.) Description of the occurrence and the development of coal in southern Montana.

739—NEW MEXICO—The Engle Coal Field, New Mexico. W. T. Lee. (U. S. Geol. Surv., Bull. No. 285, 1906.) Describes in general this undeveloped coal district.

740—OHIO—The Pittsburg or No. 8 Seam in Ohio. J. L. Pultz. (Eng. & Mg. Jl., Aug. 25, 1906; 3 pp.) Describes the coal mining operations in Belmont, Ohio. 20c.

741—PEAT—Peat and Peat Producer Gas for Power Generation. (Den Tekniske Forenings Tidskrift, Aug. 1906; 23 pp.) Describes fully the various uses of peat, particularly in gas producers with the gas utilized either under boilers or in gas engines, the latter direct-coupled to electric generators for power transmission.

742—PENNSYLVANIA—Clearfield Coal Field, Pennsylvania. G. H. Ashley. (U. S. Geol. Surv., Bull. No. 285, 1906; 4 pp.) Describes the coal seams of this famous district, and states the condition of the coal mining industry in this field.

743—PENNSYLVANIA—The Iron City Coal and Coke Co. (Coal, Aug. 30, 1906.) Describes the mines of this company at Avella, Washington Co., Pa. 20c.

744—PENNSYLVANIA—The Punxsutawney and Glen Campbell Coal Fields of Indiana and Jefferson Counties, Pa. F. B. Peck and G. H. Ashley. (U. S. Geol. Surv., Bull. No. 285, 1906; 3½ pp.) Describes the coal occurrences in this district, and gives an account of the present state of the coal mining industry in these well-known fields.

745—PIT-HEAD PLANT of the Société des Mines de Houille de Béthune, France. (Engineering, Aug. 17, 1906; 2½ pp.) Describes and illustrates by working drawings, the construction and operation of a colliery hoisting plant, in which the mine cars are handled largely automatically. 40c.

746—PROSPECTING—Progress in Coal Prospecting. (Eng. & Mg. Jl., Sept. 1, 1906.) Records the latest improvements in core drilling in soft material. 20c.

747—TRANSVAAL—The Coal Resources of the Transvaal. (Iron & Coal Tr. Rev., Aug. 17, 1906; 3 pp.) Outlines the general occurrence of coal in the Transvaal and describes in detail a number of large coal mines in that district. 40c.

748—UTAH—Book Cliffs Coal Field, Utah, West of Green River. J. A. Taff. (U. S. Geol. Surv., Bull. No. 285, 1906; 13½ pp. and map.) Describes the known occurrences of coal in eastern Utah.

749—UTAH—Coal in Sanpete County, Utah. G. B. Richardson. (U. S. Geol. Surv., Bull. No. 285, 1906; 6 pp.) Describes the occurrence of coal in central Utah.

750—UTAH—Notes on the Weber River Coal Field, Utah. J. A. Taff. (U. S. Geol. Surv., Bull. No. 285, 1906; 4 pp.) Describes the geology and nature of the coal at a number of points where active mining has progressed.

751—UTAH COAL FIELDS of the Wasatch, near Grass Creek and Weber Canon. A. Lakes. (Mines & Min., Sept., 1906.) Describes the geology and the nature of the coal obtained from these fields in central Utah. 20c.

752—VENTILATION—A New Ventilating Fan. (Coal, Aug. 23, 1906.) Describes and illustrates the construction and operation of a small high speed fan for coal mines. 20c.

753—VENTILATION—Die Wetterführung der Zeche Neumühl. J. Schmitz. (Bergbau, Aug. 9, 16, 23 and 30, 1906.) Continuation and conclusion of serial previously indexed. $1.20.

754—WYOMING—Coal and Oil in Southern Uinta County, Wyo. A. C. Veatch. (U. S. Geol. Surv., Bull. No. 285, 1906; 22½ pp. and 3 maps.) Notes the occurrence of coal and oil in western Wyoming.

COPPER.

755—ALASKA—Copper and Other Mineral Resources of Prince William Sound. U. S. Grant. (U. S. Geol. Surv., Bull. No. 284; 9½ pp.) Describes the mineral resources, mainly copper, of this district.

756—AUSTRALIAN COPPER INDUSTRY. John Plummer. (Mg. Wld., Aug. 25, 1906.) Statement of the condition of copper mining in Australia. 20c.

757—BRITISH COLUMBIA—Copper Deposits of the Eschelon Mountains, B. C. H. F. Evans. (Mg. Wld., Sept. 8, 1906.) Outlines the geology and the occurrence of certain copper deposits in the Similkameen district. 20c.

758—BRITISH COLUMBIA—The Granby Mine, British Columbia. (Eng. & Mg. Jl., Sept. 8, 1906; 3 pp.) Illustrated description of the plant and method of working at this large copper mine. 20c.

759—CALIFORNIA—Copper Deposits in the Saline Valley, Cal. R. E. Fishburn. (Eng. & Mg. Jl., Sept. 22, 1906.) States the occurrence of copper ore in Inyo Co., Cal. 20c.

760—CALIFORNIA — Greenwater Copper District. (L. A. Mg. Rev., Aug. 25, 1906.) Statement of conditions in this district of Inyo Co., Cal. 20c.

761—CALIFORNIA—Notes on the Foothill Copper Belt of the Sierra Nevada. A. Knopf. (Univ. of Cal., Vol. IV, No. 17; 13 pp.) Enumerates the copper ore occurrences along the Sierra Nevada, California. 20c.

762—CANADA—Some Observations Relative to the Occurrence of Deposits of Copper Ore on Vancouver Island, and Other Portions of the Pacific Coast. Wm. M. Brewer. (Jl. Can. Mg. Inst., Part of Vol. IX, advance copy; 9½ pp.) Describes the occurrence of copper ore along the Pacific Coast of Canada.

763—CHILE—The Metallurgy of Copper in Chile. A. Gmehling. (Eng. & Mg. Jl., Sept. 8, 1906.) Abstract from Oest. Zeit. f. Berg- und Hüttenw., Feb. 10 and 18, 1906, describing the operation of a certain copper lixiviation plant in Chile, in which the sulphuric acid necessary for the operation is made on the spot. 20c.

764—COLORADO—The Cashin Mine, Montrose Co., Colorado. W. H. Emmons. (U. S. Geol. Surv., Bull. No. 285, 1906; 3 pp.) Describes this mine, at which the principal feature of interest is the leaching process used for the extraction of silver.

765—CONCENTRATION—Notes on Concentration in Montana. C. W. Goodale. (Bull. Colo. Sch. of Mines, May, 1906.) Notes from an address by the author on the treatment of Butte ores, giving cost per ton and average analysis of the ores.

766—COPPER MATTE—Copper Converter Melting its Own Matte. E. Jacobs. (Eng. & Mg. Jl., Sept. 8, 1906.) A brief statement of the results of a procedure temporarily necessitated in which matte was melted in the same converter in which it was afterwards bessemerized. 20c.

767—COPPER MINES of the United States in 1905. W. H. Weed. (U. S. Geol. Surv., Bull. No. 285, 1906; 32½ pp.) A review of the copper mining industry in the United States during 1905.

768—DRILLING PRACTICE in the Lake Superior Copper Mines. W. R. Crane. (Eng. & Mg. Jl., Sept. 8, 1906). A detailed statement of observations on machine drilling at the copper mines of Lake Superior. 20c.

769—ELECTRIC SMELTING—Electric Copper Smelting Plant. (Mg. Jl., Sept. 1, 1906.) Translation from *Electricien*, May, 1906, giving results of operations at a smelting plant where the electric furnace is extensively employed. 20c.

770—ELECTROLYTIC COPPER—Direct Production of Copper from Electrolytic Solution. (Elec. Age, Sept., 1906; 3½ pp.) Describes a process being introduced by Messrs. Sherard Cowper-Coles & Co., by which copper can be electrolytically deposited at a rate faster than that permissible in the ordinary way. 40c.

771—ESTIMATION OF COPPER in Ore and Matte. O. H. Packer. (Mg. & Sci. Press, Sept. 1, 1906). Describes and compares the various methods of estimating copper. 20c.

772—IDAHO—Ore Deposits in the St. Joe River Basin, Idaho. A. J. Collier. (U. S. Geol. Surv., Bull. No. 285, 1906; 10 pp. and map). Outlines the topography, geology and mineral resources of the district.

773—LAKE SUPERIOR—The Geology of Keweenan Point. A. C. Lane. (Paper read before Lake Superior Mg. Inst., Aug. 8, 1906). A geological description of the Lake Superior copper district by the Michigan State Geologist.

774—MEXICO—New Smelter at Ocampo in Las Trojes. C. W. Carpenter. (Mg. Wld., Sept. 15, 1906). Describes the construction of this new copper smelter. 20c.

775—MONTANA—Copper at Butte, Mont. A. H. Halloran. (Mg. & Sci. Press, Aug. 11, 18 and 25, 1906; 9 pp.) General outline of the ore occurrence, smelting treatment and the commercial relations in this copper producing district. 60c.

776—NEW MEXICO—History and Prospects of the Black Range, New Mexico. C. H. Laidlaw. (Mg. Rep., Aug. 23, 1906). An outline of the history, geology and mineral resources of the northern Black Range of New Mexico. 20c.

777—NEW MEXICO—The Burro Mountain Copper District. S. S. Lang. (Eng. & Mg. Jl., Sept. 1, 1906). Describes the geology and ore occurrences at this locality south of Silver City, N. M. 20c.

778—NEWFOUNDLAND—Copper Mining at Tilt Cove, Newfoundland. W. Spencer Hutchinson. (Eng. & Mg. Jl., Sept. 1, 1906). Describes the pyrite mining in this famous locality. 20c.

779—SMELTING COSTS—The Cost of Smelting Copper Ore. G. F. Beardsley. (Eng. & Mg. Jl., Sept. 1, 1906). A discussion of the various items entering into the cost of producing copper. 20c.

780—STEAM SHOVEL at Bingham. L. S. Cates. (Mg. & Sci. Press, Aug. 18, 1906). Describes the preparations to mine the large low grade porphyry deposits of Bingham by the steam shovel. 20c.

781—TASMANIA—Stand der Betriebe der Mount Lyell Mining and Railway Company, Ltd., am Schlusse des Jahres 1905. Robert Sticht. (Metallurgie, Aug. 22 and Sept. 8, 1906; 10½ pp.) Describes the mine, the locality and the geology of the Mt. Lyell copper mine, Tasmania. $1.00.

782—UTAH—The Boston Consolidated, Bingham, Utah. (Eng. & Mg. Jl., Sept. 1, 1906). Describes the operation of this company in treating its large body of low grade copper ore at Bingham Canyon, Utah. 20c.

783—UTAH CONSOLIDATED MINING COMPANY. (Eng. & Mg. Jl., Sept. 15, 1906). A description of the Highland Boy mine at Bingham Canyon, and method of operating. 20c.

784 — UTAH COPPER COMPANY'S MINES and Mills. (Eng. & Mg. Jl., Sept. 8, 1906; 3 pp.) A description of the mining and milling of low grade copper ore at Bingham Canyon. 20c.

785—VIRGINIA—Copper Deposits near Luray, Va. W. C. Phalen. (U. S. Geol. Surv., Bull. No. 285, 1906; 3 pp.) Outlines the geology and the mining development of this district.

GOLD AND SILVER.

786—ALASKA—Gold Mining on Seward Peninsula. F. H. Moffit. (U. S. Geol. Surv., Bull. No. 284; 13 pp.) Describes in detail the condition of gold mining in northwestern Alaska.

787—ALASKA—Lode Mining in Southeastern Alaska. F. E. and C. W. Wright. (U. S. Geol. Surv., Bull. No. 284; 24 pp. and 1 map). Records the progress in lode mining in this district, in which placers have heretofore yielded the entire output of gold.

788—ALASKA—The Rampart Gold Placer Region, Alaska. L. M. Prindle and F. L. Hess. (U. S. Geol. Surv., Bull. No. 280; 54 pp.) Describes the geology and petrography of the district and also enumerates the occurrences of gold-bearing gravel.

789—ASSAYING — Routine Assaying on the Rand. A. Whitby. (Jl., Chem., Met. & Mg. Soc'y of So. Afr., June, 1905). Discussion by E. J. Laschinger of the abovementioned paper. 60c.

790—AUSTRALASIA—Gold Mining Industry of Australasia. F. S. Mance. (Eng. & Mg. Jl., Sept. 1, 1906). General statement of the condition of gold mining in Australia during the first six months of this year. 20c.

791—AUSTRALIA—Victorian Auriferous Occurrences; Their Mineralogical Character. T. S. Hart. (Aus. Mg. Stand., July 25, 1906). Discusses the mineralogy and the genesis of the ore at certain mines in Victoria. 40c.

792—BLACK SANDS—Investigation of Black Sands from Placer Mines. D. T. Day and R. H. Richards. (U. S. Geol. Surv., Bull. No. 285, 1906; 14 pp.) A report of the tests on the black sands from various points in British Columbia and Oregon, as conducted at Portland, Ore.

793—BRAZIL—The Gold Field of Paracatu, Minas Geraes. H. Pearson. (Trans., Mg. Inst. of Scotland, Vol. XXVIII, Part 5; 6 pp.) Describes the gold ore occurrences in this district of Brazil.

794—BRITISH COLUMBIA—Blue Bell Mine and Pilot Bay Smelter, Kootenay Lake. E. Jacobs. (B. C. Mg. Rec., July, 1906; 7 pp.) Historical outline of the development of this mine and smelter. 40c.

795—BRITISH COLUMBIA—Silverton District, Slocan. Geo. Huston. (B. C. Mg. Rec., July, 1906). Outlines the general conditions of mining in this district. 20c.

796—BRITISH GUIANA—Geological Map of Parts of the Essequibo and Cuyuni Rivers. (Georgetown, Demerara, 1906; The Argosy Co., Ltd.) A geological map of the above sections of British Guiana, showing the geological formations along the courses of the Essequibo and Cuyuni rivers. Accompanied by 29-page pamphlet by J. B. Harrison explaining the map.

797—BRITISH GUIANA — Preliminary Report of the Lower Essequibo River, the Groete Creek District, and the Lower Cuyuni River. (Georgetown, Demerara, 1903; C. K. Jardine, Govt. Printers; 12 pp.) Gives notes of a reconnaissance survey of a section of British Guiana.

798—BRITISH GUIANA—Report of the Geology of the Cuyuni River from Arawak Matope to the Akarabisi Creek. (Georgetown, Demerara, 1905: Estate of C. K. Jardine, Govt. Printers; 19 pp.) Geological observations of the above section of British Guiana.

799—BRITISH GUIANA—Report on the Petrography of the Cuyuni and Mazaruni Districts and of the Rocks at Omai, Essequibo River, with Some Notes on the Geology of Part of the Berbice River. (The Argosy Co., Ltd., Georgetown, Demerara, 1905; 71 pp.) Enumerates and describes specimens of rock from British Guiana.

800—CANADA—Note on Windy Arm Silver-Bearing Veins. R. G. McConnell. (Jl. Can. Mg. Inst., Part of Vol. IX; advance copy; 4 pp.) Describes the occurrence of silver ore in Yukon territory and mentions the development work that has been done.

801—COLOMBIA—Quartz Mining in Colombia. F. F. Sharpless. (Eng. & Mg. Jl., Sept. 15, 1906). A general statement of the condition of gold vein mining in Colombia. 20c.

802—COLORADO—Breckenridge, Colo. J. W. Neill. (Mg. & Sci. Press, Sept. 8, 1906). Describes the present operations at this famous hydraulic mining district. 20c.

803—COLORADO—Milling Plants of Summit Co., Colo. (Mg. Rep., Sept. 6, 1906). Describes the trend of the progress in mill erection in this part of Colorado. 20c.

804—COLORADO—Ore Deposits of Bear Creek, near Silverton, Colo. W. H. Emmons. (U. S. Geol. Surv., Bull. No. 285). Describes the geology, mineralogy and mineral resources of the district.

805—COLORADO—Present Milling Conditions in the Cripple Creek District, Colo. G. E. Wolcott. (Mg. Rep., Sept. 6, 1906). General statement of the condition of milling in the Cripple Creek district. 20c.

806—COLORADO—The Gold Prince Mill, San Juan County, Colo. H. J. Baron. (Mg. Rep., Aug. 30, 1906; 3 pp.) Describes the construction of this stamp mill in San Juan Co., in which steel is employed in the construction of the stamp battery frames. 20c.

807—COLORADO—The Gold Prince Mine, San Juan County, Colorado. (Mg. Rep., Aug. 23, 1906). Describes the ore occurrence at this important mine in the San Juan district. 20c.

808—COLORADO—The Idaho Springs Mining District, Colorado. J. E. Spurr and G. H. Garrey. (U. S. Geol. Surv., Bull. No. 285, 1906; 5½ pp.) Describes the mineralogy of the ores of the district.

809—CRUSHING MACHINERY — The Calculation of the Relative Deficiencies of Crushing and Grinding Machines. G. C. King and E. H. Taylor. (Monthly Jl. of the Chamber of Mines of W. Australia. July 31, 1906; 12 pp.) A comparison of costs and other considerations in the use of crushing machinery.

810—CYANIDE NOTES. E. A. H. Tays. (Mg. & Sci. Press, Sept. 1, 1906.) Statement of certain improvements inaugurated at a cyanide plant in which the ore to be treated consisted of at least one-quarter clay, with results obtained by the change. 20c.

811—CYANIDE POISONING. (Monthly Jl., Chamber of Mines of Western Australia, June, 1906; 3 pp.) Instructions how to proceed with the treatment of a case of cyanide poisoning in the absence of medical assistance. 80c.

812—CYANIDE PRACTICE with the Moore Filter. R. Gilman Brown. (Mg. & Sci. Press, Sept. 1 and 8, 1906; 6 pp.) Describes the plant and the method of ore extraction at the Standard mine, Bodie, Cal. 40c.

813—CYANIDE PROCESS—Treatment of Silver-Lead Tailings by the Cyanide Process. E. J. Sweetland. (Eng. & Mg. Jl., Aug. 25, 1906). Describes a method evolved for the extraction of gold values from lead ore tailings, in which, however, the process was facilitated by the fact that the silver occurred as chloride. 20c.

814—CYANIDE in Mexico. J. Leslie Mennell. (Mg. Wld., Sept. 15, 1906.) Historical outline of the development of this process in Mexico. 20c.

815—DENVER MINT—The New Denver Mint. R. L. Whitehead and F. E. Healy. (Mines & Min., Sept. 1906; 3½ pp.) Continuation of article previously indexed, describing and illustrating the equipment and method of operation of this mint. 40c.

816—DURANGO—E. C. Butler. (Mex. Mg. Jl., Aug. 1906). A general statement of the condition of the mining industry in Durango, Mexico. 20c.

817 — ELECTROLYTIC PRECIPITATION—Studien zur elektrolytischen Fällung des Goldes aus Cyanidlösungen. B. Neumann. (Zeit. f. Elektrochem, Aug. 10, 1906; 9½ pp.) An exhaustive study on the electrolytic precipitation of gold from cyanide solution under varying conditions of current density, strength of solution, etc. 40c.

818—FILTER PRESS—Notes on the Use of the Filter Press for Clarifying Solutions. S. J. Truscott and A. Yates. (Jl., Chem., Met. & Mg. Soc'y of So. Afr., July, 1906). States results obtained with the use filter presses at the Redjang Lebong mine. 60c.

819—GOLD COAST COLONY—Report on the Mining Industry for the year 1905. (London: Waterlow & Sons, Ltd., 1906; 27 pp.) Catalogs the producing mines on the west coast of Africa, and gives a statement of the gold production during the last few years.

820—GOLD SAVING from Caliche. F. J. Arkins. (Ores & Metals, Sept. 15, 1906.) Describes an ingenious method for handling cemented gravel in which there are large boulders. The sands first pass over a dry concentrator before going to the amalgamators and wet tables. 20c.

821 — GUANAJUATO — P. G. Holms. (Mg. Wld., Sept. 15, 1906; 3 pp.) Describes the present condition of the mining industry in this state. 20c.

822—GUANAJUATO — A Metallurgical Revolution in Guanajuato. J. W. Richards. (Electrochem. & Met. Ind., Sept., 1906; 3½ pp.) States the present condition of the ore dressing practice of Guanajuato as compared with methods formerly employed. 40c.

823—HYDRAULIC MINE in California. D'Arcy Weatherbe. (Mg. & Sci. Press, Sept. 8, 1906). Outlines the method of attacking the gravel deposits at Cherokee, Cal. 20c.

824 — HYDRAULIC MINING—Laying Hydraulic Pipe. D. H. Stovall. (Ores & Metals, Sept. 15, 1906). Describes a few ingenious schemes by which the heavy rock ballasting of hydraulic pipes can be obviated. 20c.

825—MADAGASCAR MINING. M. S. Stutchbury. (Eng. & Mg. Jl., Sept. 8, 1906). A general statement of the laws governing the mining of gold in Madagascar. 20c.

826—MEXICO—El Oro District. Jose J. Reynoso. (Mg. Wld., Sept. 15, 1906; 2½ pp.) Geological description of the ore occurrences at El Oro, and outline of the mining development in that district. 20c.

827—MEXICO—San Luis Potosi. W. P. Schumacher. (Mg. Wld., Sept. 15, 1906). Discussion of the geology and mineral occurrences of the state, and outline of the condition of the mining industry. 20c.

828—MEXICO—Sierra Juarez District. H. L. Elton. (Mg. Wld., Sept. 15, 1906). Describes the conditions governing development in this district. 20c.

829—MEXICO—Silver Lead Mines of Santa Eulalia. W. D. Pearce. (Mg. Wld., Sept. 15, 1906). Outlines the work already done and enumerates the operating companies in this district. 20c.

830—MEXICO—The Mines of El Oro. T. E. Smith. (Mg. Wld., Sept. 15, 1906). A detailed description of several of the mines at El Oro, State of Mexico. 20c.

831—MEXICO—Zacatecas. K. Thomas. (Mg. Wld., Sept. 15, 1906). Outline of the mineral resources of Zacatecas, enumerated by districts. 20c.

832—MILLING—Notes on Milling. W. Beaver. (Jl. Chem., Met. & Mg. Soc'y of So. Afr., June, 1906; 2½ pp.) Discussion by R. Weston of the above paper, and reply of author. 60c.

833—MILLING—Recovery of Water in Milling. E. J. Sweetland. (Eng. & Mg. Jl., Aug. 25, 1906). Describes a settling tank for avoiding loss of water in arid regions of Nevada, which appears to have been eminently efficient. 20c.

834—MINE FIRES—Fire in Broken Hill Silver Mines. J. Plummer. (Mg. Wld., Aug. 18, 1906). Mentions some features of the recent fires at Broken Hill. 20c.

835—NEVADA—Camp of Pioche and Its Mines. (S. L. Mg. Rev., Aug. 15, 1906; 5 pp.) Describes the conditions at this mining camp of southern Nevada. 20c.

836—NEVADA—Goldfield, Nevada. Claude T. Rice. (Eng. & Mg. Jl., Aug. 25, 1906; 3½ pp.) Describes the ore occurrence and the methods of mining at Goldfield, Nev. 20c.

837—NEVADA—Leasing at Goldfield, Nevada. C. T. Rice. (Eng. & Mg. Jl., Sept. 15, 1906; 2½ pp.) Outlines the present state of the mining industry at Goldfield, with particular reference to the activity of leasers. 20c.

838—NEVADA—The Bullfrog Mining District, Nevada. C. T. Rice. (Eng. & Mg. Jl., Sept. 22, 1906; 2½ pp.) Outlines the geology and the mining activity at this new Nevada camp. 20c.

839—NEVADA—The Camp of Osceola. W. C. Higgins. (S. L. Mg. Rev., Aug. 15, 1906). Describes the development and present conditions at this Nevada mining camp. 20c.

840—NEVADA—The Tuscarora Mining District. W. A. Root. (Mg. Wld., Aug. 18, 1906). Describes the present mining situation of this district in northern Nevada. 20c.

841—NEW ZEALAND—The First Gold Discoveries in New Zealand. R. A. Loughnan. (N. Z. Mines Rec., July 16, 1906; 6 pp.) Historical sketch of the discovery of gold in New Zealand. 40c.

842—ORE REDUCTION PLANT and Process of Reduction on the Associated Gold Mine. Robt. Allen. (Monthly Jl., Chamber of Mines of Western Australia, June, 1906; 14 pp., illustrated by numerous working drawings). Describes the plant and the method of extraction of gold at this Kalgoorlie mine. Illustrated.

843—ORE REDUCTION PLANT and Process of Reduction on the Lake Consols Gold Mine. Robt. Allen. (Monthly Jl., Chamber of Mines of W. Australia, July 31, 1906; 17 pp.) Describes the plant and the method employed at this gold mine in Kalgoorlie together with experiments on the efficiency of the ore reduction.

844—ORE TREATMENT—The Treatment of Desert Ores. L. M. King. (Mg. & Sci. Press, Aug. 25, 1906). Describes a method adopted at one of the mills at Goldfield, Nev., for the treatment of ore with a minimum amount of water. 20c.

845—OREGON—The Sumpter, Oregon, Goldfields. W. C. Higgins. (S. L. Mg. Rev., Aug. 30, 1906; 2½ pp.) Outlines the general conditions of the mining industry at this Oregon camp. 20c.

846—PLACER—What Constitutes a Placer? C. W. Purington and A. Lakes. (Mg. Rep., Aug. 16 and 23, 1906). A review of the laws governing the patenting and holding of placer deposits. 40c.

847—PLACER MINING in California. F. F. Sharpless. (Eng. & Mg. Jl., Sept. 1, 1906; 3 pp.) A statement of the difficulties in the way of operating the Colombian placer mines on a large scale. 20c.

848—QUEENSLAND—The Norton Goldfield. L. C. Ball. (Queens. Gov. Mg. Jl., July 14, 1906; 7 pp.) Conclusion of article previously indexed. 60c.

849—RAND—The Effects of Cheap Power on the Rand Mining Industry. H. W. Appleby. (So. Afr. Mines, July 28, 1906.) Outlines the advantages to be secured by a supply of cheap power for the development of South African gold fields. 20c.

850—RAND—The Rand's Place in the Gold-Mining World. (So. Afr. Mines, July 28, 1906). Statistical presentation of the position held by South African mines among the gold producers of the world. 20c.

851—RAND METALLURGICAL PRACTICE and Recent Innovations. G. A. and H. S. Denny. (Jl. So. Afr. Assn. of Engrs., June, 1906; 106 pp., tables, diagrams, etc.) An exhaustive, illustrated description of a

new plant at the Meyer and Charlton mine in South Africa, with a statement of the improved economy resulting from the utilization of recently devised apparatus.

852 — REDUCTION — The Francke-Tina Process for the Reduction of Silver Ores. A. Fox, Jr. (Proc. Inst. Civil Engrs., 1906, Vol. 163, Part I). Describes an amalgamation process used in Peru and Bolivia for the reduction of rich silver ores.

853—RHODESIA—A Note on the Rhodesian Gold-Mining Law. T. F. Van Wagenan. (Mg. & Sci. Press, Sept. 8, 1906). A humorous description of the difficulties in the way of prospecting the vast gold-bearing areas of South Africa. 20c.

854—RIFFLE—A Platinum and Gold Riffle. D. H. Stovall. (Ores & Metals, Aug. 15, 1906). Describes a method of riffling the bottom of sluices for the more perfect recovery of gold and platinum. 20c.

855 — SLIMES — Proposed Process for Treatment of Zinc Gold Slimes before Smelting. C. E. Meyer. (Jl. Chem., Met. & Mg. Soc'y of So. Afr., June, 1906; 3 pp.) A proposed improvement in the treatment of gold precipitated in zinc boxes, which, however, has not yet passed beyond the laboratory stage. 60c.

856—SODIUM CYANIDE—A Negative Experience with Sodium Cyanide. Wm. Magenau. (Eng. & Mg. Jl., Aug. 25, 1906). Reports certain experiences tending to deprecate the high estimation of sodium cyanide as a solvent for gold. 20c.

857—SOUTH AFRICA—Mining Progress on the East Rand. (So. Afr. Mines, Aug. 4, 1906). States the progress of the mining industry on the East Rand, with particular reference to the use of electricity in driving stamp mills. 20c.

858—SOUTH AFRICA—The New Rietfontein Estate Co.'s Success with the Du Preez Series. (So. Afr. Mines, Aug. 11, 1906). States the present condition of work at this mine on the Rand. 20c.

859—TUBE MILL PRACTICE. W. R. Dowling. (Jl. Chem., Met. & Mg. Soc'y of So. Afr., June, 1906; 6 pp.) Discussion by members of the Society of the abovementioned paper. 60c.

860—WASTES IN MINING. S. Jennings. (So. Afr. Mines, July 21, 1906). Paper read before the S. A. Assn. for the Advancement of Sci., pointing out the several directions in which expenses are wasted in the South African gold mines. 20c.

861—WESTERN AUSTRALIA—Goldgewinnungs-Anlagen und -Methoden in West-Australien. C. Göpner. (Metallurgie, Aug. 22, 1906; 8 pp.) Describes plant of the Associated Northern Gold Mine of Western Australia and method of treatment employed. 60c.

862—WESTERN AUSTRALIA—Notes on Western Australia Mines. W. Burrell. (Eng. & Mg. Jl., Sept. 8, 1906). General outline of progress in the gold districts of Western Australia. 20c.

863—YUKON PLACER FIELDS. L. M. Prindle. (U. S. Geol. Surv., Bull. No. 284; 19 pp.) Describes the condition of the mining industry in the Yukon placer fields.

GRAPHITE.

864—GRAPHITE in Maine. G. O. Smith. (U. S. Geol. Surv., Bull. No. 285, 1906; 3½ pp.) Notes the occurrence of graphite at two localities in western Maine.

GYPSUM.

865—GYPSUM of the Uncompahgre Region, Colorado. C. E. Siebenthal. (U. S. Geol. Surv., Bull. No. 285, 1906; 2½ pp.) Describes the occurrence of gypsum in southern Colorado.

866—GYPSUM DEPOSITS of the Laramie District, Wyoming. C. E. Siebenthal. (U. S. Geol. Surv., Bull. No. 285, 1906). Describes the occurrence of gypsum in Western Wyoming.

IRON AND STEEL.

867—BASIC STEEL—Der Einfluss des Siliciums und Graphits beim sauren Martinprozess. A. S. Thomas. (Metallurgie, Aug. 8, 1906; 4 pp.) Discusses the behavior of steel with varying silicon and graphite contents in the acid open hearth. 40c.

868—BERTRAND-THIEL PROCESS—A Few Remarks on the Bertrand-Thiel Process. O. Stromborg. (Bull., Colo. Sch. of Mines, May, 1906; 6½ pp.) A general discussion of the results obtained by this new process of making steel. 60c.

869—BLAST FURNACE — Ein Beitrag zur Kalkulation in der Eisengiesserei. J. Mehrtens, Jr. (Stahl u. Eisen, Sept. 1, 1906; 5½ pp.) Notes on the methods of keeping account of the input and output of iron blast furnaces. 60c.

870—BLAST FURNACE — Metallurgical Calculations: The Rationale of Hot-Blast and Dry-Blast. J. W. Richards. (Electrochem. & Met. Ind., Sept., 1906). Mathematical discussion of the influence of hot-blast and dry-blast upon the yield of iron from the blast furnace. 40c.

871—BLAST FURNACE CHARGING APPARATUS. (Iron Age, Aug. 23, 1906). Describes and illustrates a bucket filling system in use at the Youngstown Steel Co.'s furnace at Youngstown, O. 20c.

872 — BLAST FURNACE GAS — The Cleaning of Blast Furnace Gas. F. E. Junge. (Iron Age, Aug. 30 and Sept. 6, 1906; 9½ pp.) Describes the various means that have been utilized for cleaning blast furnace gas to make it suitable for use in gas engines. 40c.

873—CAST IRON—Crushing Loads and Microstructure. W. J. Keep. (Amer. Mach., Aug. 30, 1906; 7½ pp.) Records the results of tests on the crushing and tensile strengths of cast iron, together with a study of the microstructure induced by strains. 20c.

874—CAST IRON—Malleable Cast Iron. G. A. Akerlind. (Iron Tr. Rev., Aug. 23, 1906). Abstract of paper read at the April meeting of the Scandinavian Technical Society, outlining the steps in the fabrication of malleable cast iron. 20c.

871 — CORROSION — Electro-Positive Coatings for the Protection of Iron and Steels from Corrosion. S. Cowper-Coles. (Paper read before the British Association, Aug. 8, 1906). Describes several methods employed for galvanizing iron pipe.

876—CRYSTALLOGRAPHY OF IRON—Die Kristallographie des Eisens. F. Osmond and G. Cartaud. (Metallurgie, Aug. 8, 1906; 26 pp.) A study on the structure of various irons subjected to different kinds of stresses. 60c.

877—ELECTRIC FURNACE—Der elektrische Stahlschmelzofen von Kjellin. E. C. Ibbotson. (Metallurgie, Aug. 8, 1906; 2½ pp.) Discusses the operations and results of the Kjellin electric furnace. 40c.

878—ELECTRIC FURNACE—Methods of Iron and Steel Production. J. B. C. Kershaw. (Iron Tr. Rev., Aug. 30, 1906; 3½ pp.) Continuation of article previously indexed, describing the Keller furnace and process of smelting. 20c.

879—ELECTRO-MAGNETIC CRANE for the Loading of Bar-Iron. A. Gradenwitz. (Elec. Rev., Lond., Aug. 31, 1906.) Describes and illustrates a crane for handling rolled iron material, in which the electromagnet is used to furnish the lifting power. 40c.

880—FORGING PRESSES—German Hydraulic Forging Presses. F. C. Perkins. (Eng. Times, Sept. 6, 1906). Describes a number of hydraulic presses used in German forging works. 20c.

881—FOUNDRY—A Plea for Lower Blast Pressures in Cupola and Air Furnaces. W. H. Coleman. (Paper read before the June, 1906, meeting of the Amer. Fdymen's Assn.; 7 pp.) A comparison of results from the use of high and low blast pressures in melting furnaces.

882—FOUNDRY—The Steel Foundry at Cincinnati. (Iron Age, Sept. 6, 1906). Describes and illustrates the plant of the Steel Foundry Co. at Cincinnati. 20c.

883—FOUNDRY COSTS—An Investigation by the Worcester Polytechnic Institute. (Iron Age, Aug. 23, 1906). Shows the relation between the cost per pound of output and the number of men and their efficiency. 20c.

884—GREAT BRITAIN—The Lowmoor Iron Works. (Iron & Coal Tr. Rev., Aug. 24, 1906; 3½ pp.) A complete description of the plant of this old English iron firm. 40c.

885—HARD STEELS—Beiträge zur Aufklärung über das Wesen der Gefügebestandteile Troostit und Sorbit. E. Heyn and O. Bauer. (Stahl u. Eisen, Aug. 15, 1906; 7½ pp.) A microscopic study of the structure of hard steels subjected to quenching at various temperatures. 60c.

886—HAULAGE in Iron Mines of Alabama. W. R. Crane. (Mg. & Sci. Press, Aug. 25, 1906; 3 pp.) Describes and illustrates the various improvements that have been introduced for hauling and handling the iron ore on the surface and underground at the mines in the Birmingham district. 20c.

887—HEMATITE Mining in New York. R. B. Brinsmade. (Eng. & Mg. Jl., Sept. 15 and 22, 1906; 4½ pp.) A detailed description of the method of mining at the Caledonia mine near Gouverneur, N. Y. 40c.

888—IRON AND CALCIUM. O. P. Watts. (Jl. Amer. Chem. Soc'y, Sept., 1906; 3½ pp.) It is shown by attempts to alloy iron and calcium that iron does not combine, but that the latter undergoes certain changes. 60c.

889—IRON ORES—The Production of Iron Ores in 1905. J. Birkinbine. (Extract from Mineral Resources of the U. S., Calendar Year 1905; 38 pp.) Gives statistics of the iron ore industry of the United States and other information in regard to the nature of the ores.

890—KENTUCKY—Iron Ores of Bath County, Ky. E. M. Kindle. (U. S. Geol. Surv., Bull. No. 285, 1906; 2½ pp.) Gives analyses of iron ores from various parts of Kentucky.

891—LAKE SUPERIOR—Important Operations in Lake Superior Mines. (Iron Tr. Rev., Sept. 6, 1906; 4½ pp.) Outlines the present condition of the iron ore industry in the Lake Superior district. 20c.

892 — NICKEL-MANGANESE-STEEL — Eisen-Nickel-Mangan-Kohlenstoff - Legierungen. (Stahl u. Eisen, Sept. 1, 1906; 5½ pp.) Extensive discussion of the physical, chemical, mechanical and electrical properties of nickel-manganese-steel. 60c.

893—OPEN-HEARTH STEEL CASTINGS. W. M. Carr. (Fdy., Sept., 1906; 2½ pp.) Continuation of serial, discussing the influence of impurities on castings from the open-hearth furnace. 20c.

894—STEEL—Die Konstituenten der Eisen-Kohlenstoff-Legierungen. A. Sauveur. (Metallurgie, Aug. 8, 1906; 17 pp.) Discusses the composition and structure of steel, as influenced by impurities and different heat treatments. 60c.

895—STEEL PLANT—The Bay View Works of the Illinois Steel Co. (Iron Age, Aug. 23, 1906; 5½ pp.) Outlines the progress in the construction of this large steel plant which is now being erected. 20c.

896—SULPHUR IN IRON—Zur Bestimmung des Schwefels im Eisen. W. Schulte. (Stahl u. Eisen, Aug. 15, 1906; 6 pp.) A discussion as to the merits of certain methods of sulphur determination in iron analysis. 40c.

897—TEMPERING—Anlass- und Schneideversuche mit Schnelldrehstählen. H. C. Carpenter. (Metallurgie, Aug. 8, 1906; 14 pp.) Results of physical and microscopic tests on spring steel annealed for varying lengths of time. 60c.

898—TIN PLATES—The Manufacture of Tin Plates. R. B. Thomas. (Engineering, Aug. 10, 1906; 5 pp.) Paper read before the British Association, Aug., 1906, meeting, stating the present condition of the tin plate industry in the United Kingdom, and describing the apparatus and method employed in making tin plates, taken from a typical tin plate factory. 60c.

899—VIRGINIA—The Brown Ores of the New River-Cripple Creek District, Virginia. R. J. Holden. (U. S. Geol. Surv., Bull. No. 285, 1906; 4 pp.) Enumerates the occurrences of brown iron ores in Virginia. 20c.

900—VIRGINIA—The Oriskany and Clinton Iron Ores of Virginia. E. C. Eckel. (U. S. Geol. Surv., Bull. No. 285, 1906; 6½ pp.) Describes the geology of the iron district of Virginia. 20c.

LEAD.

901 — BRITISH COLUMBIA — Improvements at the Hall M. & S. Co.'s Smelter at Nelson, B. C. H. Harris. (B. C. Mg. Rec., July, 1906; 2½ pp.) Describes the improvements recently installed at this smelter. 40c.

902—BRITISH COLUMBIA—The Lead Industry in British Columbia. Geo. Huston. (Eng. & Mg. Jl., Sept. 22, 1906). A statement of the degree to which the lead mining industry of the United States, Canada and Mexico is hampered by the American protective tariff. 20c.

903—SMELTING—Present Position of Lead Smelting in Germany. F. T. Havard. (Eng. & Mg. Jl., Aug. 25, 1906). An exhaustive statement of the condition of the lead smelting industry in Germany at the present time. 20c.

MAGNESITE.

904—CALIFORNIA—Some Magnesite Deposits of California. F. L. Hess. (U. S. Geol. Surv., Bull. No. 285, 1906; 7 pp.) Describes the occurrence of magnesite in California. 20c.

MANGANESE.

905—ALLOYS—Theory of the Magnetic Alloys of Manganese. C. E. Guillaume. (Electrician, Lond., Aug. 17, 1906). Proposes a theory to explain the magnetic properties of alloys of manganese, aluminum and copper. 40c.

906—MANGANESE ORES—The Production of Manganese Ores in 1905. J. Birkinbine. (Extract from Mineral Resources of the U. S., Calendar Year 1905; 29 pp.) Gives statistics of the production of manganese-bearing material in the United States and other countries in 1905 and previous years.

907—MANGANESE ORES. Wilhelm Venator. (Bihang till Jern-kontorets Annaler, Aug., 1906; 20 pp.) Gives an exhaustive report on all known manganese ore deposits of the world, with yearly outputs and complete analyses. 80c.

NICKEL.

908—CANADA'S NICKEL DEPOSITS. J. A. MacDonald. (Mg. & Sci. Press, Aug. 25, 1906). Outlines the general situation in the Sudbury nickel district. 20c.

909—GIN PROCESS—Treatment of Ore Containing Nickel in New Caledonia, and Electro-metallurgical Production of Nickel by Gin's Process. (Eng. Times, Sept. 6, 1906.) Abstract of article in *L'Electricien*, describing apparatus and method of extracting nickel by the Gin process from New Caledonian silicate ores. 20c.

910—NICKEL DEPOSITS—On the Nickel Deposits of Webster, Western North Carolina. A. E. Barlow. (Jl. Can. Mg. Inst., Part of Vol. IX, advance copy; 13½ pp.) States the geology of that part of western North Carolina in which nickel has been found, and describes the small amount of development work that has been done.

911—NICKEL-COPPER ORES—Genetic Relations of Nickel-Copper Ores, with Special Reference to the Deposits at St. Stephen, N. B. and Sohland, Germany. C. W. Dickson. (Jl. Can. Mg. Inst., Part of Vol. IX, advance copy; 25 pp.) Discusses the probable origin of the ores at St. Stephen, N. B. and Sohland, Germany.

PETROLEUM.

912—CALIFORNIA—The Salt Lake Oil Field Near Los Angeles, Cal. R. Arnold. (U. S. Geol. Surv., Bull. No. 285, 1906; 4½ pp.) Describes the geology and the oil development of this region. 20c.

913—ELECTRIC POWER STATION, Winding Gear and Pumping Plant of the Tarbrax Oil Company, Limited. Jas. Caldwell. (Trans. Mg. Inst. of Scotland, Vol. XXVIII, Part 5; 10 pp.) Describes a petroleum pumping plant that is operated entirely by electricity.

914—OIL FIELDS of the Texas-Louisiana Gulf Coastal Plain. N. M. Fenneman. (U. S. Geol. Surv., Bull. No. 282; 146 pp.) Describes the geology of the district, gives the results of numerous borings, and describes the general condition of the oil industry in this field.

915—OIL FUELS—Die Heizwertbestimmung flüssiger Brennstoffe mit dem Junkersschen Kalorimeter. E. Glinzer. (Zeit. f. ange. Chemie, Aug. 17, 1906). Descrjbes the application of the Junkers calorimeter to the testing of oil fuels for thermal capacity. 40c.

916—PENNSYLVANIA—The Nineveh and Gordon Oil Sands in Western Greene County, Pa. F. G. Clapp. (U. S. Geol. Surv., Bull. No. 285, 1906; 4½ pp.) Notes on the stratigraphy of the oil-bearing horizons of this region.

917—PETROLEUMS of North America. A. Comparison of the Character of Those of the Older and Newer Fields. C. Richardson. (Jl. Franklin Inst., Aug., 1906; 47 pp.) Compares the physical and other properties of petroleums from different parts of the United States and other countries. 60c.

918—RUMANIAN OIL FIELDS—Electric Power at the Rumanian Oil Fields. D. St. Emilian. (Pet. Rev., Aug. 18, 1906). Shows the progress that has been made in the Rumanian oil fields towards replacing steam power by electricity. 20c.

919—WYOMING—Coal and Oil in Southern Uinta County, Wyo. A. C. Veatch. (U. S. Geol. Surv., Bull. No. 285, 1906; 22½ pp.) Notes the occurrence of coal and oil in western Wyoming.

PLATINUM.

920—PLATINUM—The Output of Gold and Platinum of the Ural in 1905, and the Causes of the Rise in the Price of Platinum. (Mg. Jl., Sept. 1 and 8, 1906). Translation from the *Torgovo Promishlennaia Gazeta*, giving statistical data of the mineral production of the Ural in 1905, and reasons for the great rise in the price of platinum. 40c.

921—PLATINUM SILVER ALLOYS. J. F. Thompson and E. H. Miller. (Jl. Amer. Chem. Soc'y, Sept., 1906; 18½ pp.) An exhaustive study into the properties of this alloy, the principal one of which is its solubility in nitric acid. 60c.

PRECIOUS STONES.

922—DIAMONDS and Carbons in Brazil. H. W. Furniss. (Pop. Sci. Monthly, Sept., 1906; 8½ pp.) Describes the occurrence of diamonds in Brazil and the methods of mining them. 40c.

923—DIAMONDS—Some Details of Recent Tests in Diamond Treatment. (So. Afr. Mines, Aug. 11, 1906). Describes plant recently installed for the recovery of diamonds by a process of dry crushing and blowing. 20c.

924—DIAMONDS—The Occurrence of Diamonds in the Drift of Some of the Northern States. Robt. Bell. (Jl. Can. Mg. Inst., Part of Vol. IX; advance copy; 4 pp.) Enumerates the finds of diamonds in the glacial drift of the northern central states, and collects the evidence pointing to the finding of their origin in Canada.

PYRITES.

925—SPAIN—Die Kieslagerstätten von Aznalcollar (Prov. Sevilla). (Zeit. f. prak. Geol., Aug. 1906). A discussion of B. Wetzig's earlier article on the Huelva pyrites deposits. 40c.

QUICKSILVER.

926—AMALGAMS—On the Constitution of Amalgams. G. McP. Smith. (Amer. Chem. Jl., Aug. 1906; 12 pp.) A further study into the physical composition of the various mercury amalgams. 60c.

927—CINNABAR DEPOSIT of Oregon. D. H. Stovall. (Mg. Wdl., Aug. 25, 1906.) Describes briefly the general features of the quicksilver industry in Oregon. 20c.

928—SERVIA—Die Quecksilber-Lagerstätten am Avala-Berge in Serbien. H. Fisher. (Zeit. f. prak. Geol., Aug., 1906; 11 pp.) Describes the geology, petrography and ore occurrence at this quicksilver mine south of Belgrade, Servia. 40c.

RARE EARTHS AND METALS.

929—BRAZIL—Ueber die brasilianischen Monazitsandlagerstätten. A. Dieseldorff. (Chem. Industrie, Aug., 1906; 3 pp.) Historical outline of trade conditions in the Brazilian monazite industry, with technical data as to the occurrence and composition of the Brazilian sands.

930—MOLYBDENUM—Elektrisches Verschmelzen sulfidischer Erze und Hüttenprodukte unmittelbar auf Metall. C. Lehmer. (Metallurgie, Aug. 22 and Sept. 8, 1906; 10 pp.) Describes method of reducing molybdenum and molybdenum alloys with other metals. $1.00.

931—RARE EARTHS—Comment se Pose actuellement la Question des Terres Rares. G. Urbain. (Rev. générale des Sciences, Aug. 15, 1906; 8½ pp.) Outlines the present state of the art of separating and purifying the rare earths. 40c.

932—RARE EARTHS in Pegmatite Veins. J. Obalski. (Jl. Can. Mg. Inst., Part of Vol. IX, advance copy). Brief note on the occurrence of uranite, monazite and other rare earths in Canada.

933—RARE METALS—Bemerkungen über Columbium und Tantal. E. F. Smith. (Electrochem. Zeit., Aug., 1906; 4 pp.) Historical outline of the discovery of these elements, with notes on their occurrence, nature, etc. 60c.

934—TANTALUM—Das Tantal und die Tantallampe. W. von Bolton. (Zeit. f. ange. Chem., Sept. 7, 1906; 3 pp.) Describes the properties of tantalum, its occurrences, and enumerates the alloys into which it enters. 40c.

935—VANADIUM—A New Occurrence of Vanadium in Peru. F. Hewett. (Eng. & Mg. Jl., Sept. 1, 1906). Describes the occurrence of a vanadium-bearing mineral in Peru, for which the name patronite has been suggested. 20c.

SAND.

936—GLASS SAND of the Middle Mississippi Basin. E. F. Burchard. (U. S. Geol. Surv., Bull. No. 285, 1906; 14 pp.) Describes the occurrence of sand and the development of the glass sand industry in the vicinity of St. Louis, Mo.

937—GLASS SAND—The Requirements of Sand and Limestone for Glass Making. E. F. Burchard. (U. S. Geol. Surv., Bull. No. 285, 1906; 5 pp.) Gives analyses of many of the components of glass, and states the influence of impurities upon the nature of the product.

938—GLASS SAND INDUSTRY in Eastern West Virginia. G. W. Stose. (U. S. Geol. Surv., Bull. No. 285, 1906; 3 pp.) Describes the occurrence of pure quartz sand between Hancock, Md. and Berkeley Springs, W. Va., and the mining industry based upon it.

SLATE.

939—SLATE—Note on a New Variety of Maine Slate. T. Nelson Dale. (U. S. Geol. Surv., Bull. No. 285, 1906). Describes the occurrence of a bluish black slate notable for its resistance to the atmosphere.

STONE.

940—Non-Metallic Deposits of Alaska. C. W. Wright. (U. S. Geol. Surv., Bull. No. 284; 6 pp.) Enumerates the resources of southeastern Alaska in building stones, gypsum and coal.

941—LIME INDUSTRY of Knox County, Me. E. S. Bastin. (U. S. Geol. Surv., Bull. No. 285, 1906; 8 pp.) Describes the occurrence of limestones in Maine, and states the extent to which they are used.

SULPHUR.

942—ITALY—Consorzio obbligatorio per l'industria zolfifera siciliana. (Rassegna Mineraria, Aug. 11, 1906; 3½ pp.) Gives the text of the articles of incorporation of this government sulphur monopoly of Italy. 40c.

943—TEXAS—Sulphur Deposits of El Paso County, Texas. K. Thomas. (Mg. Wld., Aug. 25, 1906). A general outline of the development of the sulphur beds in eastern Texas. 20c.

TIN.

944—ALASKA—The York Tin Region. F. L. Hess. (U. S. Geol. Surv., Bull. No. 284; 13 pp.) Describes the geology and occurrence of tin in northwestern Alaska.

945—CORNWALL—Occurrence of Tin in the St. Austell District. R. H. Williams. (Mg. Jl., Sept. 8, 1906). Describes the geology and ore occurrence in this tin district of southwest England.

946—MALAY STATES—Tin Mining in the Malay States. J. Place. (Engineering, Aug. 31, 1906; 2½ pp.) Statement of the condition of the tin mining industry in the Malay Peninsula, with particular reference to some of the lode mines. 40c.

947—MALAY TIN FIELDS—Geology of Malay Tin Fields. R. Stokes. (Mg. Wld., Sept. 8, 1906). Describes the occurrence of tin ores in the Malay Peninsula, with a discussion of their probable origin. 20c.

948—MALAY TIN FIELDS—Industrial Position of the Malay Tin Fields. R. Stokes. (Mg. Wld., Sept. 1, 1906). Outlines the general condition of the tin industry in the Straits Settlements, and describes in detail some mining operations in that field. 20c.

949—PRODUCTION of Tin in 1905. F. L. Hess. (Advance chapter from Mineral Resources of the U. S., Calender Year 1905; 11 pp.) Statistics of the production of tin in the United States and foreign countries; imports and the tin market.

950—QUEENSLAND—Rover Tin Mine Centrifugal Sand Pumping Plant. (Queens. Govt. Mg. Jl., July 14, 1906.) Describes and illustrates a sand pump used in an alluvial tin deposit in Queensland. 60c.

951—TEXAS—Tin in the Franklin Mountains, Texas. G. B. Richardson. (U. S. Geol. Surv., Bull. No. 285, 1906; 3½ pp.) Describes the prospecting for tin in the extreme western portion of Texas.

ZINC.

952—DE BAVAY PROCESS. (Eng. & Mg. Jl., Aug. 25, 1906). Describes the ap-

paratus employed and the method of operation of a sulphide separating system similar in some respects to the well-known Potter and Delprat processes. 20c.

953—DRILLING CONDITIONS of the Missouri-Kansas Zinc Fields. D. Brittain. (Lead & Zinc News, Aug. 27, 1906; 7 pp.) Discusses the progress of drilling exploration in southwestern Missouri, and mentions the difficulties met with. 20c.

954—MAGNETIC SEPARATION at Galena, Illinois. (Eng. & Mg. Jl., Sept. 15, 1906). Describes the plant of the Joplin Separating Co. at Galena, Ill., and states the results obtained at it. 20c.

955—MEXICO—Future of Zinc Industry in Mexico. K. Thomas. (Lead & Zinc News, Aug. 13, 1906). Reports the opinions of Kirby Thomas as to the future of the zinc inductry in Mexico. 20c.

956—MEXICO—Zinc Mining in Chihuahua. L. Worcester, Jr. (Mg. Wld., Sept. 15, 1906). Discusses the probability of a zinc industry in Mexico. 20c.

957—MILLING—Ore Milling in Wisconsin. Trego and Brooks. (Eng. & Mg. Jl., Aug. 25, 1906). An explanation and an excuse for the apparently inefficient method of ore milling in Wisconsin. 20c.

958—NEVADA ZINC DEPOSITS. H. Foster Bain. (U. S. Geol. Surv., Bull. No. 285, 1906; 4 pp.) A discussion of the ore occurrence at Potosi mine near Good Springs, Colo.

959—NEW MEXICO—Kelly, New Mexico. R. B. Brinsmade. (Mines & Min., Sept., 1906; 4 pp.) Describes the geology and the ore occurrence at this zinc field of New Mexico. 40c.

960—RUSSIAN POLAND—The Zinc Industry in Russian Poland. (Mg. Jl., Aug. 11, 1906). Gives a comprehensive statement of the present condition of the zinc industry in this important European zinc producing district. 20c.

961 — WISCONSIN — Enterprise Mine, Platteville, Wis. (Eng. & Mg. Jl., Sept. 8, 1906). Describes the mining and milling operations at this mine in the Wisconsin zinc field, at which magnetic separation plays an important part. 20c.

962—WISCONSIN—Mining and Milling at Platteville, Wis. (Eng. & Mg. Jl., Sept. 22, 1906.) Outlines the mining industry and describes some of the mines at this Wisconsin zinc field. 20c.

963—WISCONSIN—The Mineral Point Zinc Works. (Eng. & Mg. Jl., Sept. 1, 1906; 2½ pp.) Describes the various departments of these works at Mineral Point, at which the ore is magnetically separated, zinc oxide being made from the zinc concentrate, and sulphuric acid being made from the iron portion of the ore. 20c.

964—WISCONSIN Zinc Fields. (Eng. & Mg. Jl., Aug. 25, 1906.) Gives an outline of the condition of the zinc mining industry around Mineral Point, Wis. 20c.

ECONOMIC GEOLOGY—GENERAL.

965—AIR BLASTS—Stresses in the Country Rock as the Cause of Air Blasts in the Mines at Pribram, Bohemia. H. Stefan. (Sch. of Mines Quar., July, 1906; 8 pp.) A discussion of the phenomena of air blasts observed in the Bohemia mines. 60c.

966—ALASKA—Ketchikan, Alaska. H. W. Turner. (Mg. & Sci. Press, Aug. 11, 1906). Describes the petrography and mineralization of this Alaskan district. 20c.

967—ALASKA—Report of Progress of Investigations of Mineral Resources of Alaska in 1905. Alfr. H. Brooks and others. (U. S. Geol. Surv., Bull. No. 284; 169 pp.) Reports by various members of the Survey on the progress in the mining industry of Alaska during 1905, dealing with railway routes, various coal fields and markets for Alaska coal, lode mining, non-metallic deposits, copper deposits, Yukon placer fields, York tin region, etc.

968—ALASKA—The Yakutat Bay Region. R. S. Tarr. (U. S. Geol. Surv., Bull. No. 284; 4 pp.) Describes the geology and mineral resources of the above district in southern Alaska

969—ARIZONA—Williams Fork District, Arizona. O. H. Reinholt. (Mg. Wld., Aug. 25, 1906.) A general outline of progress in this district of western Arizona. 20c.

970—CANADA—On the Need of a Topographical Survey of the Dominion of Canada, Particularly with Reference to the Development of the Economic Resources of the Dominion. F. D. Adams. (Jl., Can. Mg. Inst., Part of Vol. IX, advance copy, 12½ pp.) Outlines the method by which the Dominion of Canada ought to be surveyed.

971—CHINA—La Géologie du Bassin Rouge de la province du Se-Tchouan (Chine). E. C. Abendanon. (Rev. univ. des Mines, July, 1906; 92 pp.) Continuation of article previously indexed, outlining the geology and petrography of the Red river valley of China. $1.00.

972—CONCRETIONS—New Forms of Concretions. H. W. Nichols. (Field Col. Museum, Pub. No. 111, June 1, 1906; 41 pp.) Describes a group of peculiar concretions of various substances from different parts of the world.

973—CRINOID—Hyposocrinus, a New Genus of Crinoids from the Devonian. F. Springer and A. W. Slocum. (Field Col. Museum, Pub. No. 114, 1906; 5 pp.) Describes and illustrates a crinoid found in the Hamilton shales of western New York, which has been referred to a new genus.

974—CRYSTALLOGRAPHY—The Determination of the Geometrical Constants of a Crystal from its Interfacial Angles. A. J. Moses. (Sch. of Mines Quar., July, 1906; 29 pp.) Describes a way of measuring the required angles and outlines a method of computing from these the crystallographic properties of the mineral under discussion. 60c.

975—ECONOMIC GEOLOGY and Mineral Deposits. F. C. Nicholas. (Mg. Wld., Sept. 8, 1906.) A discussion of the various types of ore deposits as influencing mining methods. 20c.

976—FOSSILS—A List of Devonian Fossils Collected in Western New York, With Notes on Their Stratigraphic Distribution. A. W. Slocom. (Field Col. Museum, Pub. No. 113, 1906; 10 pp.) Describes the vertical range of the occurrence of a number of Devonian fossils in western New York.

977—GENESIS OF ORE DEPOSITS—Contact Metamorphism in Its Relation to the Genesis of Certain Ore Deposits. Jas. Park. (N. Z. Mines Rev., June 16, 1906.) Abstract of paper read before the Otago Institute, being a further discussion of the genesis of ore deposits, illustrated by the ore occurrences in Australia. 40c.

978—GENESIS OF ORE DEPOSITS—Thermal Activity in Its Relation to the Genesis of Certain Metalliferous Veins. Jas. Park. (N. Z. Mines Rec., July 16, 1906; 3½ pp.) A discussion on the connection between thermal-activity and ore deposits. 40c.

979—GEOLOGY AND THE MINING LAWS of the United States. J. D. Irving. (Yale Sci. Monthly, June, 1906.) Shows the inadequacy of the U. S. mining laws to cover the location of all kinds of ore. 20c.

980—GERMANY—Die Mineralausfüllung der Querverwerfungspalten im Bergrevier Werden und einigen angrenzenden Gebieten. H. E. Boker. (Glückauf, Aug. 18, 1906; 18 pp.) Describes the vein systems and mineralization of a group of Rhenish mines. 60c.

981—INDIA—Report on the Chitaldrug and Tumkur District. E. W. Wetherell. (Records, Mysore Geol. Dept., Vol. V; 63 pp.) Report on a geological survey of a certain part of India. $1.20.

982—MAGMATIC SEGREGATION—The Influence of Varying Degrees of Superfusion in Magmatic Differentiation. A. C. Lane. (Jl. Can. Mg. Inst., Vol. IX, advance copy; 8 pp.) Further discussion of the question of ore segregation.

983—METALLOGRAPHY—The Application of Metallography to Opaque Minerals. Wm. Campbell. (Sch. of Mines Quar., July, 1906; 8½ pp.) Describes a method by which the microstructure of opaque substances can be studied with the microscope. 60c.

984—MEXICO—Notes from Magdalena Bay, Mexico. C. Biddle. (Eng. & Mg. Jl., Aug. 25, 1906.) A brief statement of the mineral resources of Lower California. 20c.

985—MEXICO—Observations in Southwestern Chihuahua. W. H. Seamon. (Mg. Wld., Sept. 15, 1906.) General notes on the scenery, mode of travel and occurrences of mineral veins in this district. 20c.

986—MEXICO—On the Cumbre de San Manuel Trail. C. DeKalb. (Mg. & Sci. Press, Aug. 18, 1906.) Geographical and geological description of the southwest portion of Chihuahua, Mexico. 20c.

987—MEXICO—Résumé of the Progress of Geology in Mexico. J. G. Aguilera. (Mg. Wld., Sept. 15, 1906; 4 pp.) Historical outline of the development of geological knowledge in Mexico. 20c.

988—NEVADA—Geology of Pioche, Nevada, and Vicinity. F. J. Pack. (Sch. of Mines Quar., July, 1906; 26 pp.) Continuation of article previously indexed, describing the occurrence of ore in White Pine county, Nevada. 60c.

989—ORE DEPOSITS—Superficial Alteration of Ore Deposits. E. A. Ritter. (Ores & Metals, Sept. 1, 1906.) An elementary study of the relation between water level and the zones of alteration, leaching and enrichment in veins. 20c.

990—QUEBEC—Probabilite de Trouver des Mines au Nord de la Province de Quebec. J. Obalski. (Jl., Can. Mg. Inst., Part of Vol. IX; advance copy.) Outlines the work already done to the north of Quebec, and states the probabilities of ore occurrence in that region.

991—RHODESIA—The Mining Fields of Southern Rhodesia. J. W. Gregory. (Trans. Mg. Inst. of Scotland, Vol. XXVIII, Part 5; 3¼ pp.) Discussion of the above paper, previously indexed, by O. Ferguson.

992—SECONDARY ENRICHMENT UPWARD. C. DeKalb. Mg. & Sci. Press, Aug. 11, 1906.) An explanation of the interesting fact noted in the Lake Superior copper district that the upper portions of copper lodes are sometimes the richest. 20c.

993—UNDERGROUND WATER—Summary of the Underground Water Resources of Mississippi. A. F. Crider and L. C. Johnson. (U. S. Geol. Surv. W. S. & I. Paper. No. 159; Washington, 1906; 86 pp.) Gives results of borings for underground water at numerous points in Mississippi.

994—U. S. GEOLOGICAL SURVEY—Investigation of Metalliferous Ores, Iron Ores and Non-Metalliferous Minerals. E. C. Eckel. (U. S. Geol. Surv., Bull. No. 285; 11 pp.) A review of the investigation work which has been done during the past year in various parts of the United States, and list of publications issued by the Survey during the same period.

995—VOLCANIC ASH near Durango, Colo. L. H. Woolsey. (U. S. Geol. Surv., Bull. No. 285, 1906; 3 pp.) Describes the occurrence of volcanic ash and notes the uses that have been made of it.

996—WYOMING—Mineral Resources of the Bighorn Basin. C. A. Fisher. (U. S. Geol. Surv., Bull. No. 285, 1906; 4½ pp.) Describes the mineral resources of this section of Wyoming.

997—WYOMING—Mineral Resources of the Bighorn Mountain Region. N. H. Darton. (U. S. Geol. Surv., Bull. No. 285, 1906; 7½ pp.) Describes the mineral resources of this section of Wyoming.

998—ZOISITE from Lower California. O. C. Farrington. (Field Col. Museum, Pub. No. 112, May 15, 1906; 4 pp.) Describes a fine specimen of zoisite from the Trace mine in the Juarez district of Lower California.

MINING—GENERAL.

999—ALASKA—Mining in Ketchikan District, Alaska. W. M. Brewer. (Eng. & Mg. Jl., Sept. 8, 1906.) Describes the condition of the mining industry in this mining district in southern Alaska. 20c.

1000—ALASKA—The Mining Industry in 1905. A. H. Brooks. (U. S. Geol. Surv., Bull. No. 284; 5½ pp., 1 map.) Gives statistics of gold, copper and other resources of Alaska for 1905 and previous years.

1001—BRAZIL—Matto Grosso, Brazil. A. Brandenburg. (Eng. & Mg. Jl., Sept. 1, 1906). General statement of the means of access to this mining district in central Brazil, and future prospects. 20c.

1002—BRITISH COLUMBIA—Notes on a Trip to Boundary, Rossland and Nelson Districts. (B. C. Mg. Rec., July, 1906; 5 pp.) Outlines the latest developments in the various mines in southern British Columbia. 40c.

1003—CALIFORNIA—Register of Mines and Minerals, Santa Barbara county, California. (Issued by the State Mining Bureau, 1906.) Enumerates the mines in Santa Barbara Co., Cal., with maps of their location. 40c.

1004—CANADIAN DEPARTMENT OF MINES or Geological Survey. J. B. Tyrrell. (Jl. Can. Mg. Inst., Part of Vol. IX; 4¼ pp.) Shows the necessity for the establishment of a mining bureau in the Canadian Department of the Interior.

1005—CHILE—Mining and Metallurgy in Chile. Vattier. (Mg. Jl., Sept. 8, 1906.) Translation of paper read before the Society

of Civil Engrs. of France, July 6, 1906, reviewing the progress of the mining and metallurgical industries in Chile. 20c.

1006—CHINA—Mining in China. J. H. Curle. (Eng. and Mg. Jl., Aug. 25, 1906.) Describes the exact status of the gold and coal mining industries of China. 20c.

1007—DIAMOND DRILLING—Notes on Diamond Drilling in the Boundary District. F. Keffer. (Jl. Can. Mg. Inst., Part of Vol. IX; advance copy; 3½ pp.) Records the results of systematic diamond drill exploration in the Boundary district.

1008—DRAINAGE—Draining Down-Town District at Leadville. R. F. McLeod. (Ores & Metals, Aug. 15, 1906.) Describes steps that are being taken for draining a section of Leadville, Colo. 20c.

1009—EDUCATION of Mining and Metallurgical Engineers. J. B. Porter. (Jl. Can. Mg. Inst., Part of Vol. IX; 29½ pp.) A discussion as to the best way of imparting engineering knowledge, and outline of a course in ore dressing suitable for use in any well-equipped mining school.

1010—HOISTING—Indicateur de Vitesse Enregistreur pour Machines d'Extraction. E. Dinoire. (Bull., Soc. de l'Industrie minérale, T. V., II livr., 1906; 9½ pp.) Describes a mechanism for recording the speed of hoisting and the time elapsed at top or bottom of hoisting shaft.

1011—IDAHO—The Coeur d'Alenes of Shoshone County, Idaho. W. C. Higgins. (S. L. Mg. Rev., Sept. 15, 1906; 4 pp.) Gives some details of the mining industry in northern Idaho. 20c.

1012—MEXICO—American Corporations in Mexico. G. DuBois. (Mg. Wld., Sept. 15, 1906.) Outline of the laws governing the operations of foreign corporations in Mexico. 20c.

1013—MEXICO—Brief Notes on Mining Before the Conquest. E. Martinez. (Mg. Wld., Sept. 15, 1906.) Antiquarian research into the fabulous wealth of the Aztec kingdom. 20c.

1014—MEXICO—Chihuahua. Kirby Thomas. (Mg. Wld., Sept. 15, 1906; 5½ pp.) Statement of the condition of the mining industry by districts. 20c.

1015—MEXICO—Durango. K. Thomas. (Mg. Wld., Sept. 15, 1906; 2½ pp.) Describes the present condition of the mining industry in this state. 20c.

1016—MEXICO—Jalisco. T. E. Smith. (Mg. Wld., Sept. 15, 1906.) General discussion of the geology, mineral resources and mining development of the state. 20c.

1017—MEXICO—Northern District of Durango. T. C. Graham. (Mg. Wld., Sept. 15, 1906.) Mentions the companies now operating in this district and outlines its development. 20c.

1018—MEXICO—Nuevo Leon and Coahuila. K. Thomas. (Mg. Wld., Sept. 15, 1906; 2½ pp.) A statement of the mineral resources of these two states, in which zinc ore is the most promising. 20c.

1019—MEXICO—Oaxaca. M. Clark. (Mg. Wld., Sept. 15, 1906.) Describes the mining industry by districts. 20c.

1020—MEXICO—Sonora. A. Valjean. (Mg. Wld., Sept. 15, 1906; 6½ pp.) General outline of mining and railroading in Sonora. 20c.

1021—MEXICO—The Mineral Wealth of Mexico. E. H. Talbot. (Mg. Wld., Sept. 15, 1906.) Statistics of the mineral producers and productions of Mexico for the fiscal year 1904-1905. 20c.

1022—MEXICO—The Railroads of Mexico. H. E. Maule. (Mg. Wld., Sept. 15, 1906.) Outlines the development of railroads in Mexico. 20c.

1023—MINE ACCOUNTING at Mineville, N. Y. A. E. Hodgkins. (Eng. & Mg. Jl., Sept. 22, 1906; 4 pp.) States in detail, illustrated by facsimiles of the account books, the method of cost accounting at this iron mine. 20c.

1024—MINING COSTS—Notes on Underground Mining Costs. H. F. Roche. (Jl. Chem., Met. & Mg. Soc'y of So. Afr., July, 1906; 4½ pp.) Itemizes the operating costs for underground work at some of the mines in Central Witwatersrand. 60c.

1025—MINING COSTS—Underground Costs; Some Suggested Reforms to Lessen Underground Costs. (So. Afr. Mines, Aug. 4, 1906.) A suggestion as to the financial economies to be obtained by using more water in drilling holes, and taking advantage of every possibility to facilitate shoveling and tramming of broken ore. 20c.

1026—ORE HANDLING—Ore Dock Improvements at Ashtabula. (Iron Tr. Rev., Sept. 15, 1906.) Describes a series of ore handling facilities under construction by the Pennsylvania Railroad and the Lake Shore and Michigan Southern. 20c.

1027—QUEENSLAND—Some Mines in the Burnett District. B. Dunstan. (Queens. Gov. Mg. Jl., July 14, 1906; 3½ pp.) Outlines the development of the several mines in this district of Queensland. 60c.

1028—REOPENING FILLED GROUND. R. B. Brinsmade. (Eng. & Mg. Jl., Aug. 25, 1906.) Describes a unique method of timbering applicable to the entering into and the removal of fine broken ground. 20c.

1029—SAFETY MEASURES in Mining. D. Macauley and L. G. Irvine. (Jl. Chem., Met. & Mg. Soc'y of So. Afr., July, 1906.) Discussion by various members of the Society of paper mentioned above. 60c.

1030—SANTO DOMINGO, Its Natural Resources and Their Prospective Development. F. L. Garrison. (Cassier's Mag., Sept., 1906; 18 pp.) Describes the general features of the Island and outlines the amount of mining development that has occurred. 40c.

1031—SHAFT—The Best Shaft for a Shaft. W. H. Storms. (Mg. & Sci. Press, Aug. 11 and Sept. 1, 1906.) Discusses the relative expense and other features of the arrangement of a certain shaft near Guanajuato, Mexico. 40c.

1032—SHAFT GUIDES—Fonçage et Guidage Simultanés du Puits No. 2 de Vieux-Condé. Détails de Construction du guidage, sa pose et son scellement dans le puits. S. Barry. (Bull. Soc. de l'Industrie minérale, T. V, II livr., 1906; 14½ pp.) Outlines a method of constructing guides to permit active hoisting from a shaft that is at the same time being sunk.

1033—SHAFT SINKING—B. H. Dunshee. (Bull., Colo. Sch. of Mines, May, 1906; 6 pp.) Some general considerations on the sinking and the timbering of mine shafts. 60c.

1034—SHAFT SINKING—Cost of Two Pneumatic Foundations for the Williamsburg Bridge, New York City. F. L. Pruyn. (Eng.-Contracting, Aug. 8, 15 and 22, 1906.) Gives detailed statement of costs for the sinking of pneumatic foundations for the Williamsburg Bridge. 60c.

1035—SHAFT SINKING—La Cimentation appliquée comme moyen de fonçage des puits en terrains aquifères. H. Schmerber. (Génie Civil, Sept. 1, 1906; 3½ pp.) Continuation of article describing the method of sinking through watery ground, the shaft being lined with concrete. 40c.

1036—SHAFT SINKING—Verfahren zum Abbringen von Shächten im schwimmenden Gebirge mittels der Gefriermethode unter absatzweiser Abteufung und Zuhülfenahme genau bearbeiteter Trag- und Façonringe zur Herstellung von senkrechten Gefrierbohrlöchern, System Grotenrath und Hillenblink. P. E. Grotenrath. (Bergbau, Sept. 6, 1906; 3 pp.) Describes the latest improvements in the sinking of shafts through watery ground by means of the freezing method. 40c.

1037—SHAFT SURVEYING—A Quick Vertical Shaft Survey. W. E. Downs. (Mg. & Sci. Press, Aug. 25, 1906.) Describes a quick method for surveying vertical shafts. 20c.

1038—SHAFT SURVEYING—Plumbing a Shaft. S. Barker, Jr. (Bull., Colo. Sch. of Mines, May, 1906; 3 pp.) Offers some good suggestions as to a good way of carrying a plumb line down a shaft. 60c.

1038a—SKIP HOISTING—S. A. Worcester. (Eng. & Mg. Jl., Sept. 1, 1906.) Arguments in favor of using a hoisting skip in vertical as well as in inclined shafts. 20c.

1039—SURVEYING—Right Angle Trigonometry. G. W. Miller. (Ores & Metals, Aug. 15, 1906; 2½ pp.) States a number of simple rules for surveying with crude apparatus. 20c.

1040—SURVEYING—Some Practical Points on Surveying. W. C. Wattles. (Bull. Colo. Sch. of Mines, May, 1906; 5 pp.) Some general considerations on the necessity for setting permanent monuments for surveys. 60c.

1041—TIMBER Creosoting Plant at Shirley, Ind. H. H. Knowlton. (Eng. News, Sept. 13, 1906.) Paper read before the Indiana Engineering Soc'y, describing the plant used for impregnating wood with preservative; also gives the results of long tests on the wood thus treated. 20c.

1042—TIMBERING—An Improved Method of Framing Square Sets. A. A. Steel. (Mg. & Sci. Press, Aug. 11, 1906.) An ingenious system of square set timbering, by which it is possible to reduce the complexity of the machine used for squaring and framing the ends of the timbers 20c.

1043—TRANSYLVANIA—Mining in Transylvania. E. Levy. (Mg. & Sci. Press, Sept. 1, 1906.) A general discussion of the geology and the mining industry of eastern Austria-Hungary. 20c.

1044—TUNNEL—Methods and Cost of Driving a Small Rock Tunnel. (Eng.-Contracting, Sept. 12, 1906.) Gives the detailed costs of driving a tunnel 10 by 9 ft. in California. 20c.

1045—TUNNEL—The Newhouse Tunnel at Idaho Springs, Colorado. G. C. Ripley, J. G. Gordon, Jr., W. H. Freeland, Jr., and W. H. Finnigan. (Mines & Min., Sept., 1906; 2½ pp.) Continuation of article previously indexed, describing the methods of driving, haulage, drainage, ventilation and costs. 40c.

1046—TUNNELING—Notes on the Driving of a Stone Drift by Means of Compressed Air Rock Drill. N. Nisbet. (Paper read before No. of Eng. Branch of the Nat. Ass'n. of Coll. Mgrs., July 25, 1906.) A comparison of costs of driving a rock tunnel by hand labor and by machine drilling. 20c.

1047—VENTILATION OF TUNNELS. C. S. Churchill. (Proc., Amer. Soc'y of Civ. Engrs., Aug., 1906; 14 pp.) Points out the various methods that have been employed in ventilating tunnels throughout the world. Illustrated.

1048—YUKON MINING LAWS. J. B. Tyrrell. (Jl. Can. Mg. Inst., Part of Vol. IX, advance copy; 9 pp.) Indicates the advantages and the disadvantages of the present mining law as enforced in Yukon territory.

METALLURGY—GENERAL.

1049—ANNEALING—The Annealing of Non-Ferrous Metals. (Iron & Coal Tr. Rev., Sept. 7, 1906; 2½ pp.) Describes a furnace suitable for the annealing of metals other than iron.

1050—ELECTRIC SMELTING—Sulla Siderurgia Termoelettrica. E. Stassano. (Il Politecnico, July, 1906; 23 pp.) A general discussion of the art of electric smelting, with descriptions of electric furnaces designed for the smelting of various ores.

1051—ELECTROCHEMISTRY—Die Elektrochemie im Jahre 1905. H. Borns. (Chem.-Industrie, Aug., 1906; 20½ pp.) A lengthy review of electrochemistry during 1905. To be continued.

1052—POHLE-CROASDALE PROCESS—The Application of the Pohle-Croasdale Process. O. H. Fairchild. (Mg. & Sci. Press, Sept. 1, 1906.) Describes the first attempt to employ this volatilization process, which is now in progress at the plant of the Rigby Mining & Reduction Co., at Mayer, Yavapai Co., Ariz. 20c.

1053—SAMPLING of Ores Containing Metallics. C. C. Sample. (Eng. & Mg. Jl., Aug. 25, 1906.) Describes a safe method for arriving at the total value of ore, in which the metallic portion constitutes a considerable part. 20c.

1054—SLAG Granulating and Conveying Device. H. W. Hixon. (Eng. & Mg. Jl., Sept. 22, 1906.) Describes a simple and efficient means of disposing of slag from smelting works. 20c.

1055—SULPHIDE ORES—Ueber sulfatisierende Röstung der sulfidischen Erze. R. Vondracek. (Oest. Zeit. f. Berg- und Hüttenw., Aug. 25, 1906; 4 pp.) Discussion of the roasting of sulphide ores of the different metals, showing how the involved reactions are influenced by temperature and the presence of reducing gases. 40c.

MINING AND METALLURGICAL MACHINERY.

1056—AIR COMPRESSION—Hydraulic Air Compression at the Victoria Mine. C. H. Taylor. (Mg. & Sci. Press, Aug. 18, 1906 3½ pp.) A description of the hydraulic air compressor recently installed at the Victoria mine on Lake Superior, written by the inventor and constructor of the system. 20c.

1057—AIR COMPRESSION—Variation in Atmospheric Pressure with Altitude. D. W. Hering. (Com. Air, Sept., 1906; 3½ pp.) Mathematical discussion of the influence of elevation upon the atmospheric pressure equation, showing its influence upon air compression. 20c.

1058—AIR COMPRESSOR—Taylor Air Compressor at Victoria Mine. A. L. Carnahan. (Mg. Wld., Aug. 25, 1906; 2½ pp.) Describes the unique system adopted for compressing air to 128 lb. per square inch by the use of water from a neighboring river. 20c.

1059—AIR COMPRESSORS—Intercoolers for Air Compressors. H. V. Haight. (Amer. Mach., Aug. 30, 1906.) Records the results of tests on intercoolers and discusses the economies effected by them. 20c.

1060—BELTS—The Care of Belts. C. J. Morrison. (Amer. Mach., Sept. 6, 1906.) Notes on the care and repair of leather belts. 20c.

1061—BOILER COMPOUNDS—Action of Boiler Compounds. A. A. Cary. (Engineer, Aug. 15, 1906.) Describes the principal reagents that have been used for softening boiler water, and explains their action on the boiler scale. 20c.

1062—BOILER WATER — Feed-Water Purification. R. T. Strohm. (Elec. Wld., Sept., 1906; 3½ pp.) Describes the various impurities in boiler water, together with best methods of removing them. 20c.

1063—BORING—Hydraulic Ram-Boring Apparatus. W. Wolski. (Mg. Engineering, Sept., 1906; 3½ pp.) Describes and illustrates an ingenious drill for boring holes and shaft by an apparatus embodying the principle of the hydraulic ram. 40c.

1064—CENTRIFUGAL PUMPS—R. C. Williams. (Eng. & Mg. Jl., Sept. 22, 1906.) States the general conditions governing the construction of centrifugal pumps for mining purposes. 20c.

1065—CONVEYOR—The Knights Deep Waste Rock and Sand Distributor. (So. Afr. Mines, Aug. 4, 1906.) An adaptation of the belt conveyor for distributing tailings and waste rock. 20c.

1066—DRILLS—Air Drills vs. Electric Drills. H. B. Barnes. (Eng. & Mg. Jl., Sept. 15, 1906.) A discussion of the relative advantages of air and electric drills, with particular reference to the operation of the Temple electric drill. 20c.

1067—DRILLS—Electric vs. Air Drills. C. A. Chase. (Eng. & Mg. Jl., Sept. 22, 1906.) A further discussion of the comparative values of electric and air drills, based upon experience at the Liberty Bell mine of Colorado. 20c.

1068 — ELECTRIC CRANE — Electric Sheer-Legs of 60 Tons Capacity. E. Guarini. (Mg. Wld., Aug. 25, 1906.) Describes and illustrates a large and powerful crane used in Belgium. 20c.

1069—ELECTRIC HOISTING ENGINES — Les Machines d' Extraction Electriques Résultats. P. Habets. (Rev. univ. des Mines, July, 1906; 33 pp.) Discusses the theory and practice of electric hoisting engines. $1.00.

1070—ELECTRIC POWER—Die Elektrizität im Hüttenwesen. Hans Koch. (Oest. Zeit. f. Berg- u. Hüttenw., Aug. 11, 18, 25, Sept. 1, and 8, 1906; 24 pp.) Describes and illustrates numerous mining plants in which electricity is exclusively utilized. $2.00.

1071—ELECTRIC POWER—The Truckee River General Electric Co. (Elec. Rev., Sept. 22, 1906; 4 pp.) Describes and illustrates this extensive electric plant which supplies power to the Comstock mines at Virginia City, Nev. 20c.

1072—ELECTRIC TRANSMISSION — Long Span Pole Lines. A. J. Bowie, Jr. (Elec. Wld., Aug. 25, 1906; 3½ pp.) A study in the mechanics of wire spans, analysing the different sources of stress upon the wire and its supports. 20c.

1073—ELECTRIC TRANSMISSION — The Economies of Electric Transmission. H. B. Gear. (Elec. Age, Sept., 1906; 3½ pp.) Discussion of the financial economies of electric transmission systems. 40c.

1074—GAS ENGINES—Design, Construction and Application of Large Gas Engines in Europe. F. E. Junge. (Power, Sept., 1906; 4½ pp.) Continuation of serial previously indexed, describing and illustrating the construction of the Reichenbach engine. 20c.

1075—GAS ENGINES in Commercial Service. J. R. Bibbins. (Engineer, Aug. 15, 1906; 2½ pp.) Paper read before the Ohio Soc'y of Elec. & Steam Engrs., drawing a number of comparisons between the efficiencies of steam and gas engines under varying conditions of service. 20c.

1076—GAS ENGINES—Les Moteurs a Explosion et l'Injection de Liquides Volatils. K. Schreber. (Rev. générale des Sciences, Aug. 30, 1906; 12 pp.) A discussion of the best method of cooling gas engines. 60c.

1077—HOISTING — Der Reibungswiderstand zwischen Schachtförderseil und Treibscheibe und die Wahl des Scheibendurchmessers bei Fördermaschinen nach dem System Koepe und Koepe-Heckel. Liebe. (Glückauf, Aug. 11, 1906.) Describes the operation and discusses the working conditions of the Koepe endless rope hoisting system. 40c.

1078—HOISTING PLANT—Steam Consumption of a Modern Hoisting Plant. S. Powell, Jr. (Eng. & Mg. Jl., Sept. 15, 1906; 3 pp.) A discussion of the efficiency of a very large steam hoisting plant at the Village Deep shaft on the Witwatersrand. 20c.

1079—HOISTS—Electrical Mining Hoists. J. W. H. Hamilton. (Eng. & Mg. Jl., Sept. 22, 1906; 3 pp.) Describes the success of fly-wheel electric hoisting plants in Germany. 20c.

1080 — HYDRAULIC PACKINGS — A. Reeder. (Amer. Mach., Sept. 6, 1906.) Describes the different types of packing used for tightening removable and stationary joints. 20c.

1081—HYDRO-ELECTRIC POWER—A Korean Hydro-Electric Transmission Plant. W. M. Dean. (Jl. Elec., Power & Gas, Sept. 8, 1906; 3 pp.) Describes the construction of this water-driven electric generator owned by the Oriental Consolidated Mining Co. 20c.

1082—MECHANICAL STOKERS W. R. Van Nortwick. (Engineer, Aug. 15, 1906.) Describes a variety of mechanical stokers. 20c.

1083—POWER—The Comparative Cost of Steam Engines, Steam Turbines and Gas Engines for Works Driving. (Elec. Rev., Lond., Sept. 7, 1906.) A comparison of capital expenditure and operation costs in the installation of different kinds of motive powers. 40c.

1084—POWER PLANTS—Beiträge zur Frage krafterzeugung und Kraftverwertung auf Bergwerken. Prof. Baum. (Glückauf, Aug. 11, 18, 25 and Sept. 1, 1906.) Continuation and conclusion of lengthy serial previously indexed, discussing the economy of power plants at various kinds of mines and the best kind of plant to use in a particular case. $1.60.

1085—PRODUCER GAS—Difficulties in Converting Gasolene Engines to Operate on Producer Gas. J. E. Pfeffer. (Gas Engine, Sept., 1906; 4½ pp.) Enumerates the difficulties in the way of changing an engine to run from gasolene to gas.

1086—PRODUCER GAS PLANT—Test of a Producer Gas Plant. (Engineer, Sept. 15, 1906.) Gives results of tests on a producer gas plant at the Franklin Steel Works, Rockdale, Ill. 20c.

1087—VOLTMETER—Ueber Knallgasvoltameter mit *Ni*-Elektroden und die Bildung von Nickelsuperoxyd. H. Riesenfeld. (Zeit. f. Elektrochemie, Aug. 17, 1906.) Describes an apparatus for measuring electric potential by its electrolytic effect. 40c.

1088—WINDING ROPES—The Factor of Safety of Winding Ropes. (Engineer, Lond., Aug. 24 and 31, 1906.) A mathematical discussion of the stress conditions in hoisting ropes, and a discussion of the usual causes of rupture. 60c.

FURNACES.

1089—ELECTRIC FURNACE—Its Evolution, Theory and Practice. A. Stansfield. (Can. Engr., Sept., 1906; 4 pp.) Continuation of serial previously indexed dealing with electric furnace design, construction and operation. 20c.

1090—NICKEL WIRE—Structural Changes in Nickel Wire at High Temperatures. H. C. H. Carpenter. (Paper read before the British Association, Aug. 1906, meeting.) Describes the results obtained in laboratory electric furnaces by the substitution of nickel steel wire for the more expensive platinum. Illustrated by microphotographs. 40c.

INDUSTRIAL CHEMISTRY.

1091—DYNAMITE—The Chemical Analysis of Gelatine Dynamites. T. B. Stillman and P. T. Austen. (Chem. Engr., July, 1906.) Outlines a system of analysing dynamite which differs considerably from those found in the ordinary text book. 40c.

1092—SULPHURIC ACID—Die Schwefelsäure-Fabrikation der Gegenwart. M. Feigensohn. (Chem.-Zeit., Sept. 5, 1906.) Describes the plant and the method employed in making sulphuric acid by modern processes. 40c.

1093—SULPHURIC ACID—Manufacture of Sulphuric Acid in Florida. (Eng. & Mg. Jl., Sept. 22, 1906.) Outlines the general method of operation at a sulphuric acid plant at Jacksonville, Fla. 20c.

ANALYTICAL CHEMISTRY.

1094—BALANCE—Notes on the Balance. V. H. Gottschalk. (West. Chem. & Metallurgist, May, 1906; 5 pp.) Continuation of article previously indexed, treating of the modes of performances of which balances, good and bad, are capable, including directions for the various adjustments, discussion of the accuracy obtainable under given conditions, and on the accuracy required for different kinds of work. 60c.

1095—HYDROCARBON GASES—Optische Analyse der Industriegase. F. Haber. (Zeit. f. ange. Chem., Aug. 17, 1906; 4½ pp.) Describes a spectroscopic method for analysing hydrocarbon gases much similar to that employed in the analysis of oils and sugars. 40c.

1096—MELTING POINTS—Bestimmung der Schmelzpunkte Vermittelst der Optischen Methode. C. Doelter. (Zeit. f. Elektrochemie, Aug. 17, 1906; 4 pp.) Describes the apparatus and method for determining the melting points of certain materials by the optical pyrometer, and states the melting points of the feldspars. 40c.

1097—METAL ANALYSIS—Fortschritte auf dem Gebiete der Metallanalyse. O. Brunck. (Chem.-Zeit., Aug. 11, 1906; 2½ pp.) Outlines and comments upon the newest methods of analyzing iron, nickel and cobalt, aluminum and all the common metals.

MATERIALS OF CONSTRUCTION.

1098—CEMENT—Notes on Compression Tests of Cement. W. P. Taylor. (Cement Age, Sept., 1906; 4½ pp.) Paper read before the Amer. Soc'y for Testing Materials, June 22, 1906, giving the results of compression on various kinds of cement mixed with varying proportions with different kinds of sand. 20c.

1099—CONCRETE—The Conductivity of Concrete. I. H. Woolson. (Cement Age, Sept., 1906; 9½ pp.) Paper read before the Amer. Soc'y for Testing Materials, June 23, 1906, giving the results of an investigation of the thermal capacity of concrete and the effect of heat upon its strength and elastic properties. 20c.

1100—FIRE BRICK PROBLEMS of Metallurgy. A. F. Greaves-Walker. (Iron Tr. Rev., Aug. 23, 1906; 4½ pp.) Discusses the applicability of particular kinds of refractory brick to certain kinds of smelting apparatus. 20c.

1101—LIME AND SAND LIME BRICK—Production of Lime and Sand-Lime Brick in 1905. E. C. Eckel. (Extract from Mineral Resources of the U. S., Calendar Year 1905; 6 pp.) Gives statistics of the production of lime and sand-lime brick in the United States.

1102—PORTLAND CEMENT—The Volume-Expansion of Portland Cement. F. G. Donnan and J. T. Barker. (Jl. Soc'y of Chem. Indus., Aug. 15, 1906; 2½ pp.) Describes the apparatus and method of operation employed for measuring the volume expansion of cement, and gives results of numerous tests on different kinds of cement. 60c.

1103—PORTLAND CEMENT MANUFACTURE—A Combined Pulverizer and Air Separator. B. Enright. (Eng. Rec., Aug. 25, 1906.) Describes the Fuller-Lehigh mill for pulverizing the raw materials and the finished product in cement plants. 20c.

1104 — REINFORCED CONCRETE PILES—A Method of Constructing Reinforced Concrete Piles without Forms by Rolling. (Eng.-Contracting, Aug. 22, 1906.) Describes a method and a machine for rolling reinforced concrete piles, by which method the usual mold is dispensed with. 20c.

1105—REINFORCED CONCRETE — A Rapid General Method for the Calculation of Reinforced Concrete Sections. R. T. Dana. (Eng. Rec., Sept. 1, 1906; 2½ pp.) A further discussion of the mathematics concerned in the stressing of steel concrete beams. 20c.

1106—REINFORCED CONCRETE COLUMNS—Tests of the Effect of Heat on. H. B. McFarland. (Eng. News, Sept. 20, 1906.) States the results of tests on reinforced concrete columns, subjected to high temperature and quenched with water, and on columns encased in fireproof material. 20c.